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by frank fraser darling

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FORESTRY, THE ENVIRONMENT AND MAN'S NEEDS

Frank Fraser Darling

The forester is one of the prime guardians of our conditions for continued life on this planet, not merely for some poverty-stricken existence, but for the kind of environmental quality which civilization requires.

You have honoured someone who is not a forester to give the opening address to this conference which covers so much of the planet from Tropic to Arctic. What am I to say that you do not know much better already? Certainly not much about forestry, even if I had the temerity to hold forth. Yet, believe me, the forest as an idea and as a physical and pervasive presence has been with me all my conscious life. We may have come from the waters originally, but for many millions of years the ancestors of men have been concerned with the forest as our home, the environment which has been shelter, cover, a food-gathering place and a four-dimensional world which we must have found satisfying for a long time. The forest had an element of wholeness which we have now lost, though we have gained a greater wholeness by our exploration of the environments to be found outside the forests. At this moment we do not find our relatives, the orang outang, the gorilla and the chimpanzee, to be unduly curious about the outside world, and those relatives farther back still, the lemurs, are so identified with their

forest homeland that they fail to survive if their habitat is interfered with even a little.

The emergence of man to be the species that can occupy almost all the environments the planet can offer is surely a part of this progress. He is weaned of the forest as it were, and yet my own feelings after much philosophical and physical delving is that the forest is still very much part of us, or more properly that we are still part of the forest. The coastal Eskimos may have no forest but are nomads of the ice and its leads, but do not forget that many Eskimos do have access to forest and use it. They may even gain something from it which cannot be framed by their pragmatic lives and language. It is not so long ago since the Greenland Eskimos had their birch forests and in the Brooks range of Alaska, where the Nunamiut live, I have seen groves of poplar 30 feet high. And that other nomad of central Asian plains, Genghis Khan, his antecedents and his offspring who used the horse, that plains-loving animal — it is mere uninformed imagination which makes him a man of boundless plains. His world was one of relatively treeless, very wide, very shallow valleys with ranges of hills which were forested. From my reading of those amazing people and their horses, they loved their forests too. The forest was often a seasonal home.

Some men have seen the forest as an antagonist and almost an enemy. The Khmer civilization of Cambodia ultimately fell to the forest, and now, as you look at the Bayon with the strangling fig trees ripping open exquisite masonry, you feel some awe. And the same in Yucatan, yet in fact the forest is so tender to the onslaught of man. In Europe, the forested Germanic people sometimes felt so imprisoned by the forest that they suffered the "*horror sylvanus*" as a kind of neurosis. It is indeed one of the paradoxes with which we are so intimately concerned in this conference, especially with the large trees of tropical forests, and of some, a very few, in temperate zones. The forest is mighty and awe-inspiring and yet it is so tender and fragile that it may be asked if we can keep the really great forests going at all. Has man dealt his ultimate wound already, or can we nurse the forests back into a life against which the three or four score years of man's life are as nothing?

That tropical ecologist of impeccable scientific mind, Paul Richards, who wrote *The tropical rain forest*, a most learned work, sees the tropical forests disappearing within another generation. Some of us thought possibly a century or more, during which we would have learned how to conserve, but Richards, who knows so much better than most of us, thinks 20 to 30 years. The truth is that one

Sir Frank Fraser Darling, one of the world's leading ecologists, delivered this address in September 1974 at Oxford to the Tenth Commonwealth Forestry Conference. It has been slightly shortened.

of the great strengths of a forest is immensity, whereas we have seen the tropical forests fragmented. The edges of a forest, its skirt as I have called it elsewhere, is its protection, but so many agencies can tear that skirt, and when it is shredded by fire, by grazing, by progressive forest-edge cultivation which can become a human culture of itself, by roadmaking which becomes almost a human paranoic activity, the forest is cut about so that edges measured by length are relatively so great that the central superorganism of the forest is cut about to an extent that age-old regeneration is made impossible. You can see it so plainly on the Nyika plateau between Zambia and Malawi. The agent there has been fire going wild from the slopes below. The little patches of forest, still lovely, are as good as dead on their feet.

Mexican workers, to whom I shall refer again in a moment, point out that in modern methods of clear-felling in the tropics, secondary species which are of immense importance in regeneration can be lost completely. Native clearance by a small population for slash-and-burn cultivation may even help to keep the forest going, by providing conditions for growth of secondary species in the overall palimpsest of regeneration. My own observation on this matter is that geology is an important factor in certain kinds of terrain. I have seen slash-and-burn patches on steep slopes of limestone in the Sierra Madre unable to regenerate because the rate of oxidization of new organic matter is so high that insufficient humus can form to allow the forest to come back. Great splashes of bared limestone rock appear in the landscape, whereas on neighbouring steep hills of noncalcareous shales, slow regeneration goes ahead.

What in Africa is called the base complex is a very poor rock for tree nutrition, but in flat riverine situations a rich tropical forest can grow, feeding itself as it were, and that not necessarily on a base of alluvium. The sun can be enemy as well as friend if the ground is cleared and the soil goes lateritic.

No one agency of influence can be considered alone. The tropical forest, as possibly the oldest biome on earth,

is a complex of symbioses, of subtle processes of cooperation that we know lamentably little of, even if we do apprehend that such fields for discovery lie ahead of us. Such apprehension of knowledge which must precede comprehension is again awe-inspiring as is the physical view we already had before us. Yet technology and vastly increasing human population have made severe attack on the forest possible and we live in a world of commerce and political power which calls forth all that we can devise in technological power to put us in the position of having hard currency, the hardest taskmaster man has ever had. A tree which took over a week to fell 50 years ago can now fall in a day, and rails will be run up to its mighty trunk to get it shipped away sooner than we learned how it grew,

no part of the world can afford to lose age-old resources and nature's methods of restoring them

or what intricacy of community depended on its presence in the forest. So long did it take to grow that its hardwood will soon be seasoned enough to become the floor of an air-conditioned government office where far-reaching decisions can be made.

We are here brought up against the hard fact that politics is a potent factor in forest ecology, especially in the face of an advancing technology becoming available in political situations little worried about the persistence of the forest, if it can yield ready cash now. A West Indian island, newly independent, may be offered a contract by a highly competitive exploiter to clear-fell the forest and utilize lop and top, leaving the surface bare — for what? Whether that island becomes a desert or a continuously moderately producing landscape is at the

mercy of the newly elected government. I do earnestly suggest that the United Nations, through its innovation of an environmental department at Stockholm in 1972, should devise some scheme whereby young states should be able to gain interest-free loans for essential development, such as would obviate any apparent necessity to exploit the environment on cash principles and methods. No part of the world can afford to lose its age-old resources *and* nature's methods of restoring them.

One of the most enlightening concepts of the last half century has been the growing apprehension of the complexity of the forest biome.

The tropical forest still beats us. Many workers have been content to try to catalogue the species and we can be grateful for this industriousness because until taxonomy has been accurately determined, there can be comparatively little effective ecology. Malayan research has recorded 227 woody species over 4 inches (10 centimetres) in diameter on 2.5 acres (1 hectare). This figure is of trees alone, not of shrubs, epiphytes and such herbs as there are. This necessary cataloguing is only preliminary to any understanding of the organic whole, yet it has led some workers in the past to make the wildly anthropocentric suggestion that our need is to reduce the "weed" species and concentrate on getting a purer stand of those of economic value. Such thought seems able utterly to ignore the principle of ecological *function* as well as succession. This is not a matter of Swiss Family Robinson — that everything has a value — but a recognition that species evolved by making differences, be they ever so slight, in their demands on the total environment. We are a very long way from knowing the demands being made and the niches in conversion being filled by even a tenth of those 227 species.

And what about the fauna of the forest, both vertebrate and invertebrate? Our taxonomy has a long way to go yet and our ecology is fragmentary. Yet this is the great natural resource which is probably going to disappear in a generation or so. We shall never catch up in knowledge if we do not establish very large reserves

which are not collections of edges, vulnerable edges. The great forests girdling the equator have been older than the ants which are now such important environmental factors in the forest and which we look upon as being among the oldest of land species extant. Some of the forests are still with us, but possibly most people here are concerned with them in exploitation and the few with the immense task of conservation. Yet I would hope that the two sides of forestry should keep close together and not let forest ecology — even if it may have so many apparently unimportant facets — be looked upon as academic, the field of the university expedition or the independent scholar.

I have lingered on these profound phenomena of the growth and ultimate development because I look upon the tropical forests as probably having some function of guardianship for species without the tropics, including man. Two Indian workers, Jagannathan and Bhalme (1973), have linked the incidence of monsoon rains with the sunspot cycle. There is great variation, and though we cannot influence the sunspot cycle, we can realize that the tropical forest can act as a buffer in the behaviour of monsoon rains. This variation in the monsoons is a sure indicator that we should not dispense with the forest until we are surer of its planetary significance in the weather cycle. Tropical weather is not independent of what we enjoy or suffer elsewhere. Richards, in his recent paper in *Scientific American*, has emphasized runoff control of the tropical rain forest and the different temperatures and humidities maintained at different layers of the forest. Richards closes his paper with an earnest and eloquent plea for the safeguarding and conservation of sufficient areas of the tropical rain forest while we gain fuller insight into processes which are at the heart of evolution.

The very age of the tropical forests, over several millions of years, means that we know nothing of the anatomy or physiology of their establishment, their embryology one might say. We observe secondary succession in relatively small areas but we know little enough of its action over a region. The

**The forest is mighty and awe-inspiring and y
asked if we can keep the really great fores**



1



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Some years ago FAO's Regional Forestry Officer in Latin America used this set of photographs to demonstrate, to ministers and other government officials involved in land-use questions, what happens when forests are allowed to remain unmanaged where the conditions include population pressure, fire and erosion. Photo 1 shows a natural and

t is so tender and fragile that it may be
going at all



3



4

unmanaged forest with its receding edge. Photo 2 is a broader view of the same forest demonstrating the way in which erosion spreads down steep slopes. Photo 3 is the same place five years later. Photo 4 is an adjacent area with similar soil; a predictable view of the desertification which is on the way.

Mexican workers, Gomez-Pompa, Vasquez-Yanes and Guevara (1972), indicate that regeneration is an extremely complex system working at different times and in different directions, depending on the local situation and the plants involved. The growth of vines and epiphytes are also of significance in the behaviour and survival of seedlings of trees which may ultimately replace the existing forest.

I could go on talking about the problems of the environment of the tropical forest, but what we are particularly interested in at this conference is forest environment in which man is bringing about a change, and the place of the forest in the global environment now and in the future. Perhaps you feel as I do, that before it is too late we should, as a species hoping for survival, engage our minds diligently with that physiology of community we call ecology. There may be some planting of exotics to replace the rain forest, such as the Jari scheme of the Amazon estuary, in which the Caribbean pine and a Himalayan tree of the verbena family are being used, a forest so designed that every tree will be utilized by an efficient industrial technology. What wisdom is still locked in the old rain forest is neglected.

It is a fact some of us know already that old undisturbed forests represent an energy image of the sunlight, temperatures, and water that has been shed on the environment, and that the primary geology is now somewhat of lesser consequence. The vast apparent wealth of organic material can disappear "like snow upon the desert's dusty face" and then there is desert in truth. There is real comparison to be made with forests of temperate climates where activity may be almost equal in relation to the sun and water available, but there is much less variety in the temperate zones. If we are experimentalists we like to set out our investigations in the simplest possible form so that our conclusions should have greater cogency. So, coming to the temperate zone, I would like particularly to mention the work which has been going on for nearly 40 years in Wytham Wood, so near this very city of Oxford. Doubtless you will be going to see this old English woodland of deciduous trees where,

by the inspiration and intense application of Charles Elton, originally, a wholeness of ecological survey and research has been going on with a group of colleagues of different disciplines. Some of you, accustomed to the tropical forest, may think this a simple environment, yet it is worth

by clear-felling in the tropics secondary species of great value for regeneration can be completely lost

mentioning that probably 5 000 species of animals live within 3 or 4 square miles (8 or 10 square kilometres) or so and that the wood is not uniform but presents many habitats in what is to some people just woodland. The very fact of variability of habitats in the close scientific sense means that there are many interfaces where "edge effects" are to be found. In these 40 years in which Elton's presence has been vouchsafed, many generations of undergraduates, postgraduates and scientific staff, together with a change in leadership, have played their part in an elucidation which is even now only partial. Famous ornithologists, entomologists, soil and freshwater biologists and botanists have all contributed. The technology of scientific instrumentation is now giving formerly unbelievable help in accurate recording of micro-situations.

The studies of adult forest, savanna and waste-like places have strengthened our understanding of the British environments as a whole, which in turn can so far help us to manage them, repairing where they are damaged, recreating where they are lost and maybe fashioning anew and in variety. If we learn more quickly it is because our complexity is not as great as that in tropical forests where, as I say, we have an extended environment which is significant in the planetary sense. No forest, even some of our simple

monocultural plantations, can quite be considered as collections of sticks of timber, either in the mind or on the ground. The forests must not become that kind of an arboreal creature.

It is the nature of woodland to be the home of many animals, all of which in one way or another influence environments outside. As the Swedish forest ecologist Romell has pointed out, the *ing* system of farming in southern Sweden depends on the careful distribution of woodland and ploughed ground for its success. The woodland provides shelter and leaf fall, and forest creatures benefit from the presence of stretches of grassland, like those that medieval monarchs called "lawns" in their hunting forests. Derrick Ovington, once with the Forestry Commission, later with the Nature Conservancy and now Professor of Forestry at Canberra, has for many years been improving methods of studying the effects of leaf fall and litter catchment and its associated phenomena, such as the rain of faeces from arboreal insects in their larval forms; in fact, of all that falls like manna to the forest floor and its surroundings. And in the course of the Wytham Wood investigations, H.N. Southern studied that woodland predator the tawny owl in exhaustive and exhausting detail: such work provides the framework in which one can study the greater complexity but the same principles as apply in tropical kinds of forest.

The last decade has been one of considerable individual and national awakening to environmental values in the lives of human beings. As one who has become a peripheral observer rather than an active worker in this field, I would remark on the great differences in degrees of impact of environmental concern. The ethos of care for the environment, as distinct from a primitive harmony of man with his surroundings governed by natural law, is an intellectual phenomenon which has become articulate with the decline of the wilderness and the spoliation of the immediate surroundings of the urbanizing population. It is no general response to deterioration, for so many seem indifferent and there are even pockets of people who like their world of treeless streets. But the

intellectual vision nevertheless received *wide* response from folk who had an eye for their own immediate home place, but not for a larger world: the globular rather than the lineal view of life.

The cult is no longer one of the elite or intellectual, but of the common folk. They quickly grow to appreciate that nature unspoiled and places of natural beauty have value as a whole for everybody. Yet as I said a few moments ago, the impact of environmental concern can be quite different in quality. I am sorry to feel that some large organizations with able brains see the writing on the wall so early that they realize this is a shift in public opinion they must not neglect, especially if they are to overcome it and see their profits grow. Such cells of people pay lip service and even contribute to efforts of conservation, but back of it all are the intentions of balking any checks to commercial expansion or ultimate pollution under the sacred name of development. Then there are the extremely ardent intellectual and sentimental groups which form societies and write letters to the press, but are usually short of money. They do have impact for care and conservation, but they often look rather silly unless they are extremely knowledgeably advised.

Lastly, I am sorry to see some politicians looking upon conservation of the environment as an elitist activity.

the forest speaks the language of ecological complexes

If this is so, I hope I can become as good an elitist as the eighteenth century farm labourer poets, John Clare and Robert Burns. They knew the beauty of simple things.

The National Trusts have prospered, are well managed and increasingly well patronized. Indeed, one of

their main problems, for places and parks, woodlands and seashore, is that of overpopularity. Finally, in my time, I have seen the Government take action on buying nature reserves, exercising planning control and last in our consideration but not least, in Britain, establishing the Forestry Commission. I remember the moment in 1919, but as a youth I merely thought "well that's a good thing," for every schoolboy realized how naval supremacy and industrial expansion meant disappearance of the forests, and as I said at the beginning I loved forest — but rather uncritically.

As I grew up I saw the Forestry Commission doing some odd things in the way of planting; ringing birch trees; felling whole woods of birch and oak; and of being a rather remote and "keep-out" sort of landlord. But by the time I had reached man's estate with some growing knowledge of land use, I found a new kind of Forestry Commission emerging which had got the length of establishing National Forest Parks long before any so-called National Parks had been created. Hesitantly at first, rightly rather quietly in the post-second-war period, and then, suddenly all of us were aware that the Forestry Commission had a dual function and was rapidly becoming an organization of social service in a country that badly needed exactly what it had schooled itself to give. What it gives in this day is a capacity to provide relaxation, restful and beautiful environment for a people which has had its share of being knocked about. Moreover, it is an environment of growing things and associated wildlife. The forests of Britain are no longer remote preserves cared for by nervous men, but places where the public are invited to share an environment which I truly believe worked its magic on those who planted and tended through half a century of learning. The forests educate people all the time and the Commission is commendably active in education.

It grieves me to hear so much criticism of the Commission by bodies such as that governing the ramblers who are not roses. Rambling by human beings is to be encouraged but why must so much of it be expected to take place in bare hills? Britain was

a country with less forest than any other in Europe because the forests were so mercilessly felled. How do you get forest back on long-felled countryside? Nobody knew in 1919 and the Commission was not appointed specifically to find out. The notion was to grow timber for the country's needs. Growing crops of conifers in the German style with quite a lot of silvicultural knowledge was about the limit of ambition then. But those sort of plantations are not necessarily forest. That was when the anti-forestry group got going, but now, when the better understood idea of forest is being worked upon, I repeat: how do you get a forest? The Sitka spruce, and the Cuthbertson plough are a godsend whether you like them or not. They enable us to get cover going in which later we can develop true forest. It

secondary succession is observed in small areas, but we know little about it over a region

is the work of a century at least and this span should be accepted by ramblers and similar-minded folk, that the eyesores of which they complain now are the unpleasant stage we have to go through in the re-creation of an ultimate diverse forest which we hope will give pleasure to the eyes of our grandchildren.

The Forestry Commission has become one of the most knowledgeable and active environmental bodies in the country and is exercising influence far beyond our shores. There are aspects of tree planting which nowadays the private owner cannot cover and I would like to take two examples of this kind of immediately unprofitable but absolutely necessary forestry for a civilized country to undertake.

The Culbin Sands on the south shore of the Moray Firth were undoubtedly an example of wrong medieval — and

later — land use, cultivating and grazing too near a windy, sandy coastline. So, culminating in 1695, came the big blows — which buried farms and rendered several thousand acres a landscape of changing dunes. Perhaps the desert was beautiful but it was also dangerous. How was it to be tamed? The history of the creation of the Culbin forest of Corsican, Scots, Lodgepole and Ponderosa pine is a fine story. The very ground was laboriously anchored with wire and brushwood and the conifers were planted. The coastal edge itself was given levees and buttresses of poles cut from other forests. When you see this achievement of moderate growth with birch, rowan and willow growing in naturally for diversity and leaf fall, the half century it has taken of time and men's devotion, the result arouses thankfulness. Wildlife has come in and the lichens are so remarkable that a lichenological society's visit has been arranged as a special event. The Commission cannot let the Culbin forest and its fringing sands be a national playground, but it is generous in allowing visitation by permission. It can go no farther in such a tender habitat.

The second example is what is going on in Glamorgan, south Wales. Here is another ill-used landscape of the *thoughtless* coal mining era. Vistas of tips, choked drainages and derelict country are being tackled as a cooperative project with local authorities and the Coal Board. This kind of cooperation is characteristic of the Commission in our day; it has grown with the success of tree planting.

Some 70 000 acres (28 000 hectares) of the Forestry Commission's plantations in Wales lie on the plateaus between the steep-sided valleys of the old south Wales coalfield, now increasingly residential or used for light industry, as heavy industry moves nearer the coast. Purchase of the land in the first place was facilitated by the run-down condition of farming due to the low land being used for mining and housing, coupled with the large population. These circumstances, together with free-ranging sheep and other stock, have made forestry difficult, particularly as the vegetation and the customary spring drought

have also led to the highest fire danger for any part of Britain. Nevertheless, the plantations have become substantial forests, now producing some 40 000 tons of timber per year.

In addition to the productive forests the Commission has also been heavily involved in "environmental" planting for many years, either within the forests or as agents for local authorities, for industry, and, more recently, under the derelict land programme of the Welsh Office. The types of planting may be summed up as follows:

— *Coal industry sites*: Planting on tips *in situ*; on spread tips; on restored opencast sites.

— *Industrial and urban waste*: Areas degraded by airborne heavy metals; spoil heaps; domestic refuse; furnace ash and rubble.

— *Screening and baffling*: Industrial areas; derelict areas; dangerous rock faces; motorway and trunk roads.

Now, in this passage of my address I have seemed to blow a trumpet for the Forestry Commission. I honestly believe it has been a constructive environmental force in this country, although I do grieve at some of the things that have been done, such as felling areas of scrub oak in central Wales and felling some of the old trees of the New Forest. Wildlife can be seriously curtailed by fragmentation, especially perhaps of some insects

**forestry knowledge
requires very large
reserves . . .
not collections
of vulnerable edges**

and rare flowers, and certainly of birds. Wildlife needs big enough sanctuaries.

At the same time I would take issue with those carping critics of the conifers. Are they talking common sense or being so pure and impractical that they would have the wilderness everywhere? Personally, I should love to

see a Britain in its state of wilderness and would hate to see any tree felled when it might in life and death provide woodpeckers' holes and when fallen be a haven for Collembola which are great processors and soil makers. Every dead tree on the ground starts a new life. But our country holds 55 million people and by the end of the century there will be 5 million more. I have seen antipopulation increase for over 40 years, but the increase has taken place and I can't do much about it. This is the world we live in and the one with which we have to cope. So it is my firm opinion that both the Forestry Commission and private forestry in Britain are doing a good job for the environment of this country.

Many in this audience come from countries which still have natural forests of great beauty; I ask you to consider them anew as an asset worth more than timber. Just as Kenya has found her wildlife a major economic asset in tourism, other nations of the Commonwealth can get hard currency from their forests in more ways than sawn logs.

In this respect I would ask that the landscape architect be treated as an active member of any economic or planning team. Britain still enjoys the fruits of her eighteenth-century landscape architects, who, in turn, learned from the far past. The wooded garden or larger landscape owes so much to the clever arrangement of trees. The Chinese had often very small gardens, but by their planting skill they could lead you through quiet walks and glades within an acre or two, till it was time to taste a dish of tea. Beauty can be the bonus of so much economic planting.

Lastly, to you as foresters I would ask you never to forget the planetary importance of photosynthesis with which you have so much to do, and of which you are among the arbiters. A crop of barley is also photosynthetic, but it is gone in so short a time and does not store carbon as does the forest. The forester is one of the prime guardians of our conditions for continued life on this planet, not merely for some poverty-stricken existence, but for that environmental pleasance which is the handmaiden of civilized

life. The recent emergence of man in numbers, with his mobility and weight-lifting powers, has not really consulted the forest. Either the forest is too silent or man has not learned its language, the language of ecological complexes. There is some environmental control by the forest and now there is almost invincible control over

**young states need
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for cash**

the forest which, arrogantly practised, may lose us control over so much else. We need to acknowledge and share planetary control *with* the forest, whether in the tropics or the subarctic belt. Then there is the special recreational service of forest to urban man, and there is the trend everywhere to urban living. Forest and even old hedgerow help to civilize man and ease his burden of being human. In the foregoing I have not been so presuming as to offer solutions. I haven't got any; all I hope to ask for is awareness of the natural wealth which is still with us and the concomitant desire that we should not fall to political expedience.

Yours, gentlemen, is one of the most honourable professions. Carry it with the pride of the tree which cannot speak for itself. ■

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Forest policies and national development

Forest policies need to be formulated rationally, as an intrinsic part of national development plans. Land should be allocated to forestry on the basis of forestry's capability to contribute to the improvement of living standards. Foresters need not fear that if such criteria are employed they will come out second best. On the contrary, forests, forestry and forest industries are intrinsically well suited to the solution of many of the problems of underdevelopment and to the amelioration of many of the discomforts of industrialization.

K.F.S. King

It appears that in the past forest policies were often formulated in the belief that the forests were the most important factor in forest policy formulation. Indeed, sometimes the forests were considered to be the only important factor.

It is therefore not surprising that an investigation of those forest policies which are extant reveals that there is a terrible and alarming similarity among them. This similarity exists no matter whether the forests of the country under investigation are moist tropical evergreen or temperate coniferous, no matter whether the nation is well developed technologically or extremely underdeveloped, no matter whether it is well forested or possesses only a modest area of tree cover, no

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PREPARING A MAP FOR USE IN AN AERIAL SURVEY
fitting into the picture

matter whether there is severe and endemic unemployment or relatively high employment in the country, no matter whether there are serious balance of payments difficulties or favourable payments balances, no matter whether the economy is dependent on the production of one or two commodities or whether it is well diversified.

It should also not be surprising that although governments enunciate these policies and pay lip service to them, they seldom ever appear to take them seriously, and rarely implement them.

It is the thesis of this paper that forest policies should not be formulated *in vacuo*; that they should be an integral part of the socioeconomic development of any nation; that the forests and trees are not the only considerations, but that an almost all-embracing amalgam of factors should be taken into account when attempts are made to formulate forest policies. A subsidiary but no less important thesis is that because forest policies are dependent on the political and economic philosophies of nations, and on a wide range of changing socioeconomic conditions, they cannot be treated as if they were, like the laws of the Medes and Persians, immutable. They should be subject to periodic review, and should be changed as new conditions, new technology and new philosophies warrant. It is not only the strategy of development and implementation which should change with time. Circumstances might necessitate that the policy itself be altered.

It has already been pointed out (King, 1972) that "the rapid increase in the world's population, the new concern for economic development and growth, the rapid advances in technology and science, the recent predilection for the environment, and the emancipation of large sections of the world from political domination by alien peoples are but a few of the factors which have helped to make anachronistic many of the sacred tenets of the past, and to demand new approaches to the solution of the world's problems." Some of the so-called sacrosanct principles of forest policy have been seriously questioned by Zivnuska (1966), King (1968), Nautiyal and Smith (1968) and Muthoo (1970). Accordingly, new methodologies for

forest policy formulation must be employed. Before these are examined, however, it may be pertinent to restate the characteristics of forestry, forests and forest industries in order to provide a background of relevant information.

The range and scope of the art and science of forestry cannot be adequately described in a paper of this sort. It is important, however, to outline a few salient characteristics in order to



FORESTRY WORKERS IN SOMALIA
plenty to do

demonstrate the systemic nature of forestry activities, and to emphasize that even though forestry may be described as a system, the system is not and cannot be considered closed. The practice of forestry is often inextricably linked with other national and international systems, and cannot be meaningfully examined without reference to them.

A forester establishes, maintains, tends and/or regenerates a forest not because the individual trees, or the forests as a unit, are in themselves, and without reference to their products and services, of intrinsic value. Indeed, it is possible that the existence of trees and forests may be considered a "dis-benefit" and an obstacle to other types of economic and social development. It is the value ascribed by society to forest products and services which provides the rationale for forestry activity. It follows, therefore, that the management of forest resources cannot be examined in isolation. It must be related to the benefits which it is expected will be derived from such management. More important, provision must be made, wherever possible, for the establishment of those further stages of development which will ensure that the raw material, so carefully nurtured and tended, be utilized.

For example, if logs are to be exported, roads must be constructed to the ports of export. If they are to be processed, processing facilities must be planned for and established. If the forests are to be managed for their recreational or aesthetic values, provision must be made for ensuring that these values are enjoyed by people.

Westoby (1962) has described some other characteristics which are relevant to the formulation of forest policies. He has pointed out that:

- Forests are capable of yielding commodities which may differ considerably both in their properties and in the uses to which they may be put.

- It is possible to choose the form in which forest output is harvested, and to vary the volume and time of harvesting within reasonably wide limits.

- It is possible to renew the forest resources after use.

- The duration between regeneration and harvest may vary from short periods of about three years to periods of over a century.

- Forest industries vary between the very simple and the very complex, demanding varying intensities of capital and labour, and varying levels of skill.

- Forest industries possess high forward and backward linkages.

- There is hardly a country, whatever its stage of economic development,

ADVICE TO DEVELOPERS

Soon after Dr. K.F.S. King became head of the FAO Forestry Department he addressed a meeting of the staff. The following are excerpts from his address.

Criticism

Many of the developing countries have now been independent for what they consider to be a relatively long time. Unfortunately, the rate of development which has been achieved by many of these countries has not lived up to their expectations — and their expectations are still rising. This, of course, makes our task even more difficult than it has been in the past. The developing countries have begun to look more critically at those agencies which have assisted them in their planning, in the identification and assessment of the feasibility of projects, and in the general examination of their resources.

Commitment

The modern international civil servant is now required to work with people with an improving technical background and an increasing knowledge of their own socioeconomic conditions. His task is more complex. He is met now not with uncritical adulation and hope, but with an informed and sometimes cynical recipient attitude. In these circumstances the qualities of commitment and humility

of which I spoke become even more significant. For we must never forget that we are working for the improvement of the various peoples of this world and that our *raison d'être* is the necessity for such development.

Idealism

The problems which international organizations have to face in dealing with development are immense and often frustrating, and we need the sustenance of idealism in order to overcome these difficulties. I am convinced that this international organization, and the other international organizations, cannot continue to exist and cannot be effective unless they are staffed with people who possess a humanity which transcends national boundaries, who have a willingness to understand the customs of alien cultures, and who are dedicated to the development of mankind.

UN service

The important thing in the United Nations system, in FAO, and in the Forestry Department, is that all of us who have the privilege and honour to be international civil servants have a commitment to development. It does not matter how well qualified we are, it does not matter how great our experience; if we do not have this essential commitment all our work will be to little or no avail.

and whatever the state of its resource base, in which forestry and forest industries may not be appropriate activities.

There are other attributes of forestry and forest industries which are seldom given the attention and prominence they deserve in the literature of the profession. The fact that forests and forest industries are generally located in the rural areas often reduces migration to the towns. This leads not only to a reduction in unemployment in urban areas, but also to a more equitable distribution of economic activity in a given country or region. Another and perhaps more important attribute in these days of increasing

unemployment is that forestry generally provides more employment opportunities for each unit of capital employed than is possible in most other sectors of the economy. Moreover, the system of agri-silviculture (or *taungya* or *shamba*) which has been practised by foresters in many parts of the world for more than a century, if nationally and scientifically pursued, offers exciting symbiotic possibilities for the development of both forestry and agriculture to meet the increasing demands for food and for homogeneous supplies of wood.

In addition to these benefits, forests perform valuable services for the community. They regulate and purify

water supplies, they reduce erosion in areas under and adjacent to them, they assist in the maintenance and improvement of soil conditions, they protect crops and animals from the harmful effects of wind, they provide recreational facilities for the community, and food and shelter for wildlife. The forest ecosystem also absorbs heat and noise, and acts as a climatic buffer in many areas of the world. Most important, the forestry and forest industries sector offers the basis for an integrated system of rural development in which agriculture and forestry can be developed to their fullest potential.

Those responsible for advising on the formulation of forest policies are therefore in possession of a great body of evidence which indicates that the forests can assist mankind in several ways: they can play an important role in the attack on economic underdevelopment, and they can improve mankind's quality of life in nonmaterial ways. They can be of benefit to the industrialized, often polluted, developed countries, and they can assist the developing countries to achieve higher rates of economic growth and lower levels of unemployment.

Forestry's benefits

However, it would be inadvisable to list all the recognized benefits of forestry as policy objectives in any policy statement — for two main reasons.

First, many of the benefits can only be fully attained if certain disadvantages are considered to be acceptable. For example, the *maximization* of timber production from some forests might lead to a reduction in their recreational potential, an increase in erosion and siltation, and a diminution of their potential to purify water and control its release. This is not to deny that by the adoption of particular management systems some degree of success in the attainment of multiple benefits might be achieved. If all that is required is some level of benefit from the various uses, then it may even be possible, through the use of indifference curve analysis, and by applying the principles of joint-production theory, to calculate the correct

mix of managerial and other inputs in order to achieve a desired mix of output (Gregory, 1955). Another potentially useful approach to the quantitative assessment of the degree of compatibility among a number of uses has been developed around the concept of multidimensional "conflict functions" (O'Brien and Roy, 1971). What is being asserted here is that it is often impossible to maximize the output of more than one product or service at the same time. Nevertheless: "Multiple use allows for the provision of many community requirements within the one management and operational framework, and, for many situations, community benefits in relation to costs are more readily maximized under this system of management than would be the case if single primary uses were identified and allocated for management by different authorities. It is a method of management which can efficiently respond to changing emphases in community requirements" (Australian Forestry Council, 1974).

Not in isolation

Second, man does not live by forestry alone. The benefits which might accrue from the possession of forests, the practice of forestry, and the establishment and management of forest industries must be weighed against those benefits which might flow from other forms of economic activity. The forestry subsector must be judged within the context of the socioeconomic life of the community. It should not be examined in isolation.

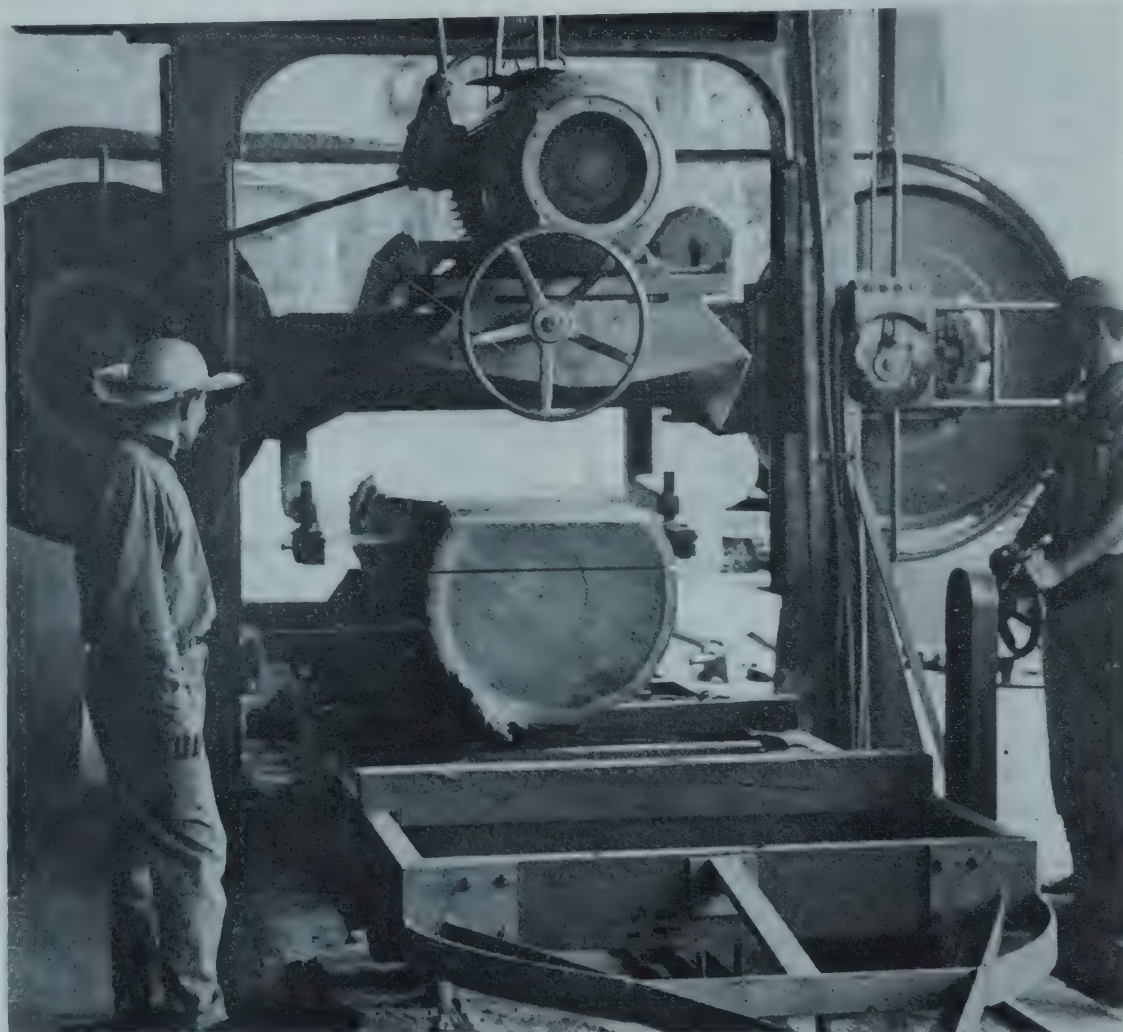
It is desirable that before a forest policy is formulated the following information be collected:

1. Data on those factors which influence land productivity, e.g., climate, topographic relief and soil characteristics.
2. Data on present population and its distribution (by location and age classes).
3. Data on current labour force and its deployment.
4. Trends in population and labour force growth.
5. Per caput income.
6. Consumption trends of the various land-produced commodities.

7. Supply possibilities, e.g., areas, volume and types of forests, forest productivity (from natural and artificial forests), productivity of other crops, etc.
8. The cost/benefit ratios of various land uses.
9. The gestation periods of alternative crops (their time-pattern scales).
10. The labour-absorptive capacity of the various possible activities and their influence on population stabilization.
11. The possibility of using the products of the land for industrialization.

is therefore desirable that the total picture be studied, and all the options ascertained.

It is not being suggested that forest policy formulation should await the preparation of a land-use plan. If the required information is not available, and it will not be readily forthcoming, then policy formulation should be undertaken using what information exists. However, the degree of sophistication of the policy should bear a direct relationship to the amount of general, nonforestry information on which it



A BAND SAW AT A COOPERATIVE SAWMILL IN PARAGUAY
do it yourself

12. The possible contribution of the various types of land uses to the balance of payments.
13. The linkage indices of the range of crops.

If it is at all feasible, a land-capacity classification of the country for which the forest policy is being formulated should be made, and a land-use plan drawn up. Land is a scarce resource in many countries, as is capital. It

is based. A policy formulated on the basis of relatively little information should be skeletal in the extreme. Conversely, it should be possible to enunciate a more refined and all-embracing policy if all the extra-forestry information requested is available, for then forestry will have been placed in its proper perspective and the interrelationships of various types of land use taken into account.

After the often conflicting demands

for land and other scarce resources are examined and reconciled, more detailed attention should be directed to the forestry subsector itself. Because the factors which indicate what proportion of a nation's resources should be devoted to forestry and forest industries are controlled by the present and future supply of, and demand for, those goods and services which forests bestow, the following exercises should be considered basic to forest policy formulation, and to the integration of forest policies with national economic policies (King, 1972):

- Evaluation of the existing forest resources, including nonwood products and services.
- Estimation of forest resource potential, including nonwood products and services.
- Estimation of present and potential yields from existing and future forest.
- Assessment of the demand for forest products.
- Assessment of the demand for forest services.
- Surveys of the feasibility of establishing various types of forests and forest industries.
- Studies of the economics of location of forests and forest industries.

These studies would indicate the extent of the area of a nation's land which should be devoted to forestry, and for how long production from those areas should be maintained.

The methodologies for evaluating the extent of the forest resource, estimating yields, assessing the demand for forest products, and studying the feasibility of establishing forests and forest industries are well developed. However, methods of forecasting the demand for the various services which forests provide are not as advanced, although they are being rapidly refined and improved.

Protective policies

In forecasting the demand for the protective services of the forests, more than usual care must be taken to link the development of a protection policy with other aspects of the overall national development policy. In addition to data on population, population

trends, and on present and future income, information must be obtained covering plans to develop the agricultural sector, the location of present and planned agricultural projects, and the current and future water needs of the community.

Self-sufficiency

It must not be assumed that a national policy of self-sufficiency and economic isolation in wood and wood products is always desirable. Indeed, it is often untenable. Moreover, even if a self-sufficiency policy were considered desirable, the demands of other sectors of the nation's economy might render it unrealistic.

If there were no communication between countries, if each nation were an island entire unto itself, if national resources were not scarce, and if no nation possessed comparative advantages over others in the production of particular commodities, then to be self-sufficient would perhaps be a necessity. Resources are scarce, however, and because of differences in climate, soil, technology, and so on, comparative advantages are enjoyed by one nation over another. It therefore follows that other things being equal it is economically better for each country to specialize in the production of those goods and services for which it is best equipped.

Conflicting demands

The problem of how much of a nation's land should be devoted to forestry cannot therefore be considered solved merely by estimating future demand, assessing physical yields, and from these calculating the desired area. After these requirements have been ascertained, conflicting demands from other land users and competing demands for capital and labour from other sectors of the economy must be reconciled. As shown earlier, this reconciliation might best be effected by the analysis of the relative profitability, different time-pattern scales, contribution to the balance of payments, labour-absorptive capacity and the possibility of industrialization of the various land uses.

The forest policy-maker now has

two broad sets of data. On the one hand, he has the estimate of total requirements of wood and wood products and of forest services, and an estimate of the area of land needed to supply these requirements; on the other, he has an estimate of the amount of resources which the economy can afford, or considers desirable, to allocate to forestry. If the latter permits the implementation of the former, he has no problems; if it does not, he must adjust his first, self-sufficient estimate to meet the restrictions and constraints of the economy as a whole. The area which can finally be dedicated to forestry is determined, therefore, not only by the needs of the forestry sector, but also by the needs and resources of the overall economy. No fixed proportion or fixed area of land must be devoted to forestry, or to any other form of land use for that matter. The physical and socioeconomic circumstances of a country must be the deciding factors in resource allocation. ■

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FORESTRY IN SOUTH AMERICA: EDUCATION AND THE FUTURE

José R.E. Bucarey

The author gives a detailed survey of forestry education throughout South America and suggests various measures for the reform and coordination of curricula. He urges especially that more young people be given the encouragement and training needed to greatly expand the number of forest technicians and skilled workers in the next decade.



FOREST TECHNICIANS STUDYING DENDROLOGY IN ECUADOR
for a continent of forests, five schools

Forestry education as it has developed in South America suffers from a serious imbalance between its univer-

sity and its technical and vocational levels. As a result of this imbalance there is an acute shortage of middle-level foresters throughout the region.

In the curricula of university-level studies one also finds that instead of setting goals based on the actual situation and trends from country to country, the curricula are adaptations from

countries more advanced in the various forestry disciplines. Therefore the type of instruction and the subject matter both fail to reflect real conditions in South America.

One also notes that despite the constant preoccupation of the authorities with the forestry sector and forestry education, this does not always lead to practical results. In virtually every country in the region there are restrictions in forestry education in terms of human resources, funds and institutions, whether in the forestry sector itself or in the educational field. Plans and projects do not materialize.

Current forestry projects in most of the countries of South America fail to call on the support of forestry education and training, however much it may be required. What is overlooked is basic: there can be no development without education.

The management and utilization of forest resources require manpower capable of solving the multiple problems connected with these resources, either through teamwork or individually. Three levels of staff are required. Forestry education should therefore aim to produce three levels of trained people: first, managerial staff — professional foresters — responsible for laying down guidelines and for the overall direction of work of maximum complexity; second, forest technicians working in the field and supervising specific kinds of work; third, an efficient force of skilled forest workers for production and servicing tasks (Centro Latinoamericano de Demografía, 1972). The existing structure for education and training on these three levels is as follows (see Table 1):

- Eighteen educational institutions at degree level for professional foresters (i.e., managerial staff).

- Five educational institutions for forestry technicians.

- Five schools in which skilled forestry workers are trained.

Of the 18 higher education institutions for forestry, 11 are in countries of the Andean Pact.¹ On the Atlantic

José R.E. Bucarey, of Chile, is well known in South America for his work in forestry education, and he has been intimately involved with the FAO Committee on Forestry Education.

¹ The Andean Pact, signed in November 1969, aims at the creation of a common market of Andean countries by 1980. The signatories are Venezuela, Colombia, Ecuador, Peru, Chile and Bolivia.

side of South America, schools at that level are found only in Brazil and Argentina. There are some part-time schools in Uruguay but none at all in Paraguay, which has 51 percent of its territory under forests.

The educational institutions for forest technicians and skilled workers are all in Andean Pact countries.

Managerial staff, professional foresters (personal orientador)

Professional foresters are required to detect needs and grasp complex problems in the forestry sector, to gather background information, analyse situations and problems, set measurable objectives and consider alternative solutions, to work with groups and participate in interdisciplinary technical discussions, to make decisions by choosing the best of several alternatives, to efficiently plan forestry work of all types, to organize, coordinate and supervise execution of tasks and to evaluate job performance and the extent of achievement of the pre-established purposes (Chile. Comisión Permanente en Ciencias Agropecuarias y Forestales, 1974).

At the managerial staff level in South America there has been active promotion of forestry education. In 1960 there were only six schools in existence, but this number had increased to 18 by 1974. Not only have new schools been founded but constant efforts are being made to upgrade the quality of teaching. There are post-graduate forestry schools in Venezuela and in Brazil.

All these managerial schools require as part of the entrance qualifications a secondary school certificate in the humanities or the equivalent, and most of them require in addition that applicants pass an entrance examination. Courses of study in all these schools last five or six years, except in Brazil where they are for four years. Most schools require the submission of a thesis and that some time be spent in practical work. Examinations are graded in the traditional manner, and candidates for degrees must accumu-

THE FORESTRY SCHOOLS OF SOUTH AMERICA

(Table 1)

	Cat- egory ¹	Year of foun- dation
<i>Argentina</i>		
Nac. de Córdoba (Stgo. del Estero)	P	1958
U. de La Plata (Bs. As.) .	P	1960
U. Nac. del Nordeste (Formosa)	P	
U. Nac. de La Plata	M	1960
U. Nac. de Buenos Aires	M	
<i>Bolivia</i>		
U. Boliviana Misael Saracho	P	1967
U. San Simón	M	
<i>Brazil</i>		
U. Federal de Paraná (Curitiba)	P	1960
U. Federal de Vicosa . . .	P	1964
U. Federal do Rio de Janeiro	P	1967
U. de São Paulo (Piracicaba)	P	1963
U. de Belém/Pará	M	
U. Federal de Santa Maria	M	
Colegio Agrícola Irati/Paraná	M	
<i>Chile</i>		
U. de Chile (Stgo.)	P	1952
U. Austral de Chile	P	1964
U. de Concepción (Los Angeles)	T	1966
U. Católica de Chile (Talca)	T	1973
U. Técnica del Estado (Concepción)	T	1962
Ministerio de Educación	W	1949
Corporación Nacional Forestal	W	1973
<i>Colombia</i>		
U. Distrital Fco. José de Caldas	P	1950
U. del Tolima (Ibaqué) . .	P	1962
U. Nacional de Colombia (Medellín)	P	1951
U. Nacional de Colombia (Medellín)	T	
<i>Ecuador</i>		
U. Vargas Torres (Esmeralda)	P	1970
Centro Capacitación Forestal	W	
<i>Paraguay</i>		
U. Nacional de Asunción .	M	
<i>Peru</i>		
U. Nacional de La Molina	P	1962
U. Nacional del Centro (Huancayo)	P	1960
U. Nac. de la Amazonia Peruana	P	1972
U. Nacional Amazonia P. (Iquitos)	T	1972
Escuela Genaro Herrera (Iquitos)	W	
<i>Uruguay</i>		
U. de la República (Montevideo)	M	1960
U. del Trabajo (Maldonado)	M	
<i>Venezuela</i>		
U. de Los Andes (Mérida)	P	1948
U. de Los Andes (Mérida)	W	

¹ P = professional foresters, managerial staff; M = miscellaneous; T = forest technicians; W = skilled workers.

late more than 150 credits, each credit being equivalent to one hour in the classroom or two to three hours of laboratory or field work per week. The total number of credits required in the various schools is anywhere between 153 and 260.

A comparison of the curricula of 14 of the 18 schools shows that they consist of 10 semesters, with the exception of the schools in Brazil where they are completed in eight semesters. A considerable number of subjects are offered which, for purposes of analysis, may be grouped (following Shirley, 1958) under the following headings: complementary, basic, technical, and professional/vocational. These subjects and the time devoted to them are given in Table 2. Table 3 shows a percentage breakdown of the emphasis given to these four groups of subjects in each of the 14 schools.

Thus it can be seen from the number of credits per group of subjects and the proportions of these subjects in the curricula that the current trend is to devote much time to basic and complementary subjects, and to include a great many technical and vocational/professional subjects as well.

Only four schools — Curitiba, Vicosa, Austral and Mérida — devote more than 66 percent of their curricula to technical and vocational/professional subjects. The rest use 33 percent or more of their curricula for complementary and basic subjects, some as much as 42, 49 and 50 percent.

The figures are not indicative of any real trend in forestry education in these schools because the professional/vocational subjects fall into four subgroups, depending on what the schools offer in their various faculties, departments or institutions, rather than on possible fields of specialization, such as forestry management or forest industries and products (Shirley, 1964).

The professional/vocational subjects corresponding to each subgroup are as follows:

— FOREST RESOURCES: silviculture, soil science, genetic improvement, forest protection, soil and water conservation.

— FOREST INDUSTRIES AND PRODUCTS: wood science, wood technology, pulp and paper, sawmilling, timber preser-

vation and curing, lumbering, board and plywood, wood use.

FOREST MANAGEMENT: mensuration, forest inventory, management methods, wild lands, forestry economics, cost/return analysis, industrial management, marketing.

— **FORESTRY ENGINEERING:** watershed and torrent control, forest roads, machinery, construction, building stability, energy sources, hydraulics.

The educational standards of South American forestry schools are steadily advancing. They are revising their curricula to bring them up to date, and are enabling their teaching staff to obtain advanced training, primarily in pedagogy, but also in professional/vocational subjects.

In order to cover gaps in the pedagogy and methodology background of the teaching staff, forestry schools have formed associations or launched joint programmes for advanced training, drawing on each other's resources as

well as calling on schools of agriculture and veterinary medicine for assistance. The Instituto Interamericano de Ciencias Agrícolas of the Organization of American States has been the leader and coordinator of these programmes.

Problems of professional/vocational manpower training have been solved to some extent with scholarships and fellowships available through foundations, international agencies and under bilateral conventions. The latter have provided for study at La Molina, Mérida, Curitiba, Universidad de Chile and Austral.

However, these efforts are still inadequate. Only half the teaching staff in five of these 14 schools hold or are earning postgraduate degrees, while the remaining schools, either because they were only recently created or because they have been unable to obtain sufficient assistance, have few professionals holding postgraduate degrees.

It is estimated that there are 560 teachers of technical and professional/vocational subjects holding professional degrees in the 18 schools in this category. The figures fluctuate between 19 and 95 teachers per school. Fewer than 25 percent of these university instructors — 116 — are full-time, ranging from 2 to 53 persons per school.

The low percentage of full-time professional teachers in university posts means, among other things, that very little planned research is being done at the universities. In general, research has been a matter of personal interest or concern of individual teachers, and has not been adequately planned in the light of available resources and the requirements of the various countries. A very few schools in Venezuela, Brazil, Peru and Chile may be exceptions to this general rule, as they do have regular programmes for region-wide research.

WHAT THEY STUDY — SUBJECTS AND CREDIT HOURS

(Table 2)

Subjects \ University	La Plata, Argentina	Misael Saracho, Bolivia	Curitiba, Brazil	Viosa, Brazil	de Chile		Austral, Chile	Distrital, Colombia	Medellín, Colombia	Vargas Torres, Ecuador	La Molina, Peru	Nacional del Centro, Peru	Nacional de la Amazonía, Peru	Mérida, Venezuela
					Forest resources	Util. forest resources								
	Credit hours													
Complementary	8	10	4	16	3	1	7	16	9	9	17	15	15	—
Basic	56	101	56	52	55	60	69	79	77	62	67	50	55	57
Physics, chemistry, mathematics	45	68	40	32	33	38	49	57	58	39	43	27	32	41
Biological sciences	11	29	16	20	15	15	15	19	15	19	16	18	16	12
Socioeconomic sciences	—	4	—	—	7	7	5	3	4	4	8	5	7	4
Technology	21	33	66	77	29	35	64	72	41	49	36	39	34	46
Physics, chemistry, mathematics	12	12	36	31	7	14	24	32	18	20	18	10	17	28
Biological sciences	9	14	19	21	14	12	30	30	17	18	12	19	12	14
Socioeconomic sciences	—	7	11	5	8	9	10	10	6	11	6	10	5	4
Professional/vocational	68	72	128	65	56	68	89	90	75	71	53	70	74	62
Forest resources	19	18	41	14	27	22	19	21	20	14	7	14	16	19
Forest industries	18	15	22	14	19	15	27	21	20	23	25	28	22	7
Forest management	16	21	34	20	16	24	24	21	24	20	14	20	33	20
Forestry engineering	15	18	31	17	14	7	19	27	11	14	7	8	3	16
Others	—	4	8	—	5	—	—	3	—	3	—	3	3	8
General total	153	220	162	210	148	164	229	260	202	194	173	177	177	173

Another shortcoming of scientific education in general in South America is that there is no permanent information office or agency furnishing facts and figures about what the various countries are doing in the fields of science and technology. Furthermore, there is not a single regional forestry publication which appears regularly.

Shirley and Prats-Llauradó (1969) estimate that 4 800 university-trained

Forest technicians (personal ejecutor/técnicos)

Forest technicians are expected to determine requirements and specific technical problems in forestry work, gather background material, analyse situations and problems and set measurable goals, and investigate possible alternatives, working in teams and participat-

this category, and no more than 600 students enrolled for training.

In Chile, entrance requirements are a high school certificate (*bachillerato*) in the humanities or the equivalent (passing of academic aptitude test), three years of study, practical work and a final report. Colombia's school of forestry of the Instituto Nacional para el Desarrollo de los Recursos Naturales is essentially an on-the-job training centre for its own staff. At Conocoto, Ecuador, the high school diploma plus one year of training are required.

Since only the official curricula of the schools in Chile are available, it is not possible to compare them with those of other countries. But unofficially it has been learned that schools giving training up to this level have either been closed or reorganized at a higher level, so that there are none at all at present.

Skilled forest workers (personal operador)

Skilled labour is expected to be capable of doing forestry jobs, using and maintaining equipment and tools, locating and solving less serious practical problems. Skilled forest workers should also be capable of managing, organizing and supervising work done by both skilled and unskilled labour, and of acting as foremen (Chile. Comisión Permanente en Ciencias Agropecuarias y Forestales, 1974).

There are five training centres for skilled forest workers in South America — two in Chile, and one each in Ecuador, Peru and Venezuela — which altogether have trained about 10 000 people for specific forestry jobs.

If the projected figure of 22 530 for technical executive staff is accepted (Shirley and Prats-Llauradó, 1969), using the ratio in Chile of 20 workmen to one forest technician (Chile. Comisión Permanente en Ciencias Agropecuarias y Forestales, 1974), the region will need 450 000 skilled workers trained at special centres by 1985.

This gives an idea of the tremendous shortage of skilled workers in

HOW THE EMPHASIS DIFFERS IN 14 SCHOOLS

(Table 3)

University	Subjects			
	Complementary	Basic	Technical	Professional/ vocational
 Percent			
La Plata	5	37	14	44
Misael Saracho	5	50	16	29
Curitiba	2	22	25	51
Vicosa	7	25	37	31
Chile				
Utilization of forest resources	1	36	21	42
Forest resources	2	33	19	46
Austral	3	30	29	38
Distrital	6	30	28	36
Medellín	4	38	20	38
Vargas Torres	5	32	25	38
La Molina	10	39	21	30
Nacional del Centro	9	28	23	40
Nacional Amazonía Per.	9	31	19	41
Mérida	—	33	26	41

professional foresters will be needed by 1985 for all South America. There are now only 1 820 professionals in the region, and the total enrolment of forestry students is 1 600. From these figures it would appear that to meet the needs of 1985 there should be an average of 15 forestry graduates per school per year.

These thoughts should make us cautious both as regards the increased student enrolment and the establishment of new schools in countries where some already exist.

ing in technical discussions. They should be able to direct and supervise production servicing, training activities and extension work in forestry (Chile. Comisión Permanente en Ciencias Agropecuarias y Forestales, 1974).

According to projected requirements, by 1985 South America will need 33 schools or training centres and 22 530 trained forest technicians (Shirley and Prats-Llauradó, 1969). At present there are only five training centres for



CHAIN SAW INSTRUCTION FOR LATIN AMERICAN SKILLED WORKERS
an underutilized species of men

South America, both today and against future requirements. Enormous efforts will have to be made in order to meet this demand.

The next 25 years

In the next quarter century the population of South America will be predominantly youthful. It is estimated that there will be 230 million under 15 years of age by the year 2000 (Centro Latinoamericano de Demografía, 1972). Yet this is a region where restricted university enrolment and strict selection of student candidates are customary in education. A way out of this impasse must be found. It may be found by guiding youth toward technical and vocational/professional careers or skilled worker occupations. The forestry sector should welcome this policy since these are

precisely the levels at which there is a dangerous shortage of personnel.

In view of the kind of education offered, the demand for professionals and the educational requirements of the region, it is suggested that a regional commission be set up with the active participation of societies and associations of foresters, and the support of the International Union of Societies of Foresters. Such a regional commission could investigate the status of forestry education in each country and make recommendations to governments and international agencies regarding the different levels of forestry education; for instance, the closing down or support of old schools, or the establishment of new ones. In some cases it may be better for students to go abroad rather than establish new schools at particular levels in their own countries.

Forestry education in South America is of recent date and still lacks adequate staff and the resources needed to create a consciousness of the importance of forestry in the development of the region. Nor has it been possible in these recent years to develop an adequate technology which would inculcate responsible attitudes toward forestry problems. From this lack of responsibility come promises of things to be done and plans to be adopted, which amount to nothing and add to the general disillusion.

It is urged that there be a joining of forces of international bodies in the field of forestry (FAO, the United Nations Development Programme, the Organization of American States, the World Bank and others) and that from such a joint effort regional or subregional offices be created for the coordination of forestry education (includ-

ing the work of the regional commission suggested above), research and extension work in South America.

The tasks

These are some of the tasks which such offices could carry out:

- They could maintain and publish descriptions of the kinds of research being done throughout the region, together with rosters by specialty of professors and research workers.
- They could train teams of teachers available to travel to various schools to give short courses or to work on the development of curricula.
- They could train professors in university methodology, evaluation and programming of teaching.
- They could organize and maintain one or more documentation centres at the regional or subregional level.
- They could seek financing for approved programmes from agencies or institutions other than those sponsoring the system.
- They could work toward coordinated specialization of forestry schools within the region in order to avoid duplication of effort and to facilitate and promote an interchange of students and teachers wishing to specialize in certain fields of study not offered at their own schools or study centres.
- They could ensure that forestry schools in South America follow a general set of rules concerning courses of study as well as the nature and number of teaching hours per subject per day.

Reforms

Forestry education is costly. It calls for well-trained staff, teachers of high calibre, extensive practical work, travel, the maintenance of equipment and vehicles. To cope better with such expenses, the following policies are suggested:

- Schools at different levels within a certain locality should be grouped in order to give them all wider access to equipment, installations and facilities, experimentation fields and production forests. A regional register of machinery and equipment available for loan or rental should be kept.

— Forestry consultancy offices should be opened at each school for the purpose of raising income for the school.

— Sawmills, wood-working plants, furniture manufacturing and other workshops should be set up at each school and managed by the school officials, in order to supplement teaching, do research for extension work and production, and also to bring in additional income to the schools. Whenever possible experiments of this sort should be self-financing, or even profit-making.

— The schools should function as quality-testing centres for patented forest products.

— The schools should also be national research centres.

Trimesters

It is also proposed that a trimestral curriculum system be adopted for additional flexibility. This would result in the better students going through the schools more rapidly, in the more efficient use of human and material resources, and in enabling teachers from other schools or from foreign countries to participate more readily in the development of curricula. So as to better organize the teaching of various kinds of related disciplines, a method of teaching in blocks or cycles which group subjects together is also favoured. This would permit the better utilization of existing resources. It would also enable nonteaching forestry and forest industry professionals to sit in on groups of subjects useful for their particular work, using them as refresher courses. It is believed that this system would also diminish the drop-out rate, by enabling students who fail for other than strictly academic reasons to go into secondary occupations important to forestry, for example, timber grading and tree nurseries.

In this effort to make better use of available resources, the participation of nonteaching professionals should be sought for the preparation and teaching of certain subjects, and for giving shorter courses. The promotion of continuing education is important in this context.

It is also suggested that the duration of university studies be shortened

and a system of specialization established. This would have the effect of ensuring that specialization meets the real needs of a country. It should result in a country spending less money on the education of professionals who are generalists and enabling more students to acquire initial specialized training in their own countries.

All these suggestions are put forward in the full conviction that South America already has an adequate educational basis on which to build, as well as the ability to face its own problems and find solutions within the countries of the region first and foremost, and only secondarily from countries outside. The transformation of South America is not merely a matter of technology, it also involves a change of social conditions. Development depends largely on the effective involvement of the people in society, in the educational process, and in social justice, all of which is to say that to a singular degree it is a question of mind over matter. ■

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THAILAND'S FOREST VILLAGES

The forest village system, developed by Thailand's Forest Industry Organization, offers hill tribesmen and others who practise slash-and-burn agriculture considerable inducements to settle down. One of its principal aims is to keep a steady labour force on hand for the long-term needs of forestry, while at the same time providing rural families with an income and other benefits from the kind of farming they choose to practise.

Krit Samapuddhi

Reforestation schemes in developed countries usually involve the planting of trees either on bare unproductive land or in areas where mature plantations have been harvested and replanting is called for in the second rotation. But the term reforestation in southeast Asia means something else. It means either planting valuable tree species in natural forest areas which have been overexploited and have therefore lost their economic value, or replanting trees in abandoned areas where shifting cultivation has done serious damage to the forest and the land. At almost every international conference dealing with tropical forestry shifting cultivation is an important topic of discussion, yet a truly satisfactory solution to this problem has yet to be found.

Rate of loss

In Thailand, destruction of forests through shifting cultivation is a serious problem. According to the most recent studies, including the FAO timber trend study for Thailand of 1972, it has been estimated that more than

100 000 hectares of forest lands are being denuded annually by hill tribes and other farmers, especially in the northern and northeastern regions. The pattern, however, is gradually changing from shifting cultivation to illegal squatting. The lands involved are officially designated as permanent forests in accordance with the National Land Classification Policy. This destruction is undoubtedly due to increased population and the need for agricultural expansion. In many cases it is also a direct result of entrepreneurs supplying villagers with the necessary capital for moving into and clearing forests and planting farm crops. These settlers knowingly risk violating the forest law, and many refuse to move to areas designated for settlement under the jurisdiction of the government. When the time comes for carrying out reforestation programmes it is mainly these squatters who impede their execution.

Taungya, a combination of agriculture and silviculture practised on the same land, was introduced almost half a century ago in Burma. The word *taung* in Burmese means hill and *ya* means field; *taungya* signifies "field crops on the hill." The use of this system in Thailand is chiefly aimed at inducing landless villagers practising shifting cultivation to plant teak for the Forest Department in allotted areas, at the same time growing crops

such as rice, maize, beans and cotton between the rows of teak seedlings. These agricultural crops are harvested for the benefit of the villagers and without breaking the forest law or competing with forestry. The *taungya* system is therefore an economical method of reforestation and at the same time an acceptable form of agriculture for nomad or seminomad farmers. It has been practised in Thailand now for more than 20 years.

Results vary

In some places it has been fairly successful, but in others, where the system was based on loose verbal agreements without any concrete assurances of security and welfare as inducements to form permanent settlements, it has been less satisfactory. Consequently, where the *taungya* system did not work properly the labour supply for forestry was usually uneven, sometimes abundant and sometimes scarce. Most of the reforestation work of the Forest Department has therefore to rely on direct employment of labour, and this can encounter opposition from illegal squatters who firmly refuse to quit the forest reserves.

In 1968 the Forest Industry Organization, as part of its work of supporting the Royal Forest Department's annual reforestation programme, initiated the forest village system, which

Krit Samapuddhi is the former managing director of Thailand's Forest Industry Organization. He was instrumental in developing the forest village system.

is in effect a modification of the Burmese taungya method of agri-silviculture. Briefly, this is how the system works.

A reforestation unit is created, consisting of an officer-in-charge, a number of assistants, the necessary tree-planting tools and mechanical equipment. A forest village is established close to the area to be reforested, which is designated by the Royal Forest Department. The area should be large enough to enable work to be carried out over the period of years necessary for the rotation of the particular species planted.

Within the whole reforestation area annual tree-planting sections are designated. The area should be within the management capacity of the officer-in-charge. In the case of the

information and the involvement of community leaders is necessary to gain public acceptance of forest villages before they are actually started. Meetings are held with the leaders of hill tribes and other influential individuals throughout the area, such as local administrative officers and senior Buddhist monks. There are discussions about the ways in which forest villages can help to solve many local social problems and at the same time develop the nation's forest resources.

People throughout the countryside are approached with the same ideas through placards and pamphlets describing the purposes and advantages of registry as members of a forest village. Newspapers, radio broadcasts and television are employed to gain overall national acceptance of the idea.



A THREE-YEAR-OLD FOREST VILLAGE IN LAMPANG PROVINCE, THAILAND
fitting into a traditional way of life

Forest Industry Organization's work, about 1 000 rais (160 hectares) are allotted for carrying out the annual planting and the villages comprise a maximum of 100 families. If the rotation is fixed at 60 years, the area for that unit is 60 000 rais (96 000 hectares).

Within the village each family is allotted 1 rai (0.16 hectare) for building a house and for backyard gardening and raising poultry or pigs.

A systematic programme of public

Films are shown of life in a forest village, the types of work villagers are expected to do, the kind of remuneration they may expect and the welfare and security to which they would be entitled.

From the villager's point of view there are numerous advantages in giving up an existence of shifting cultivation or squatting to settle down in a forest village.

Apart from being provided with 1 rai of land on which to live, each

THE STRUGGLE TO SAVE THE FOREST

During the past two decades Thailand has lost a tremendous amount of forest area, at an average rate of 5 000 square kilometres per year. Back in 1952 forest lands reportedly represented 60 percent of our total land area but by 1972 they had been reduced to 40 percent.

Assuming that the rate of loss is increasing exponentially, that is, slowly at the beginning and accelerating to a maximum at the present time, the estimated loss of 1972 would amount to 15 000 square kilometres and the extrapolation for 1975 should be around 20 000 square kilometres. Were this situation to continue, Thailand would lose her natural forest resources within the next five years.

This assumption may seem too extreme, but we can state without hesitation that all legally accessible natural forests will have been exploited within the next five years. Only those areas theoretically set aside for special purposes such as watershed, national forest and wildlife reserve areas, which the Government is under strong obligation to protect, will survive. Accordingly, the Faculty of Forestry of Kasetsart University is expected to play a major role in national forestry, providing men trained for the management and utilization of artificial forests. Courses and research may involve plantation management, seed technique, studies of fast-growing species and so forth. Meanwhile, natural forests will not be entirely neglected, but education will be directed toward the modern concept of the multiple use of forests.

Another important aspect is extension work, which is now receiving full support: faculty members and forestry students actually participate in extension programmes, imparting information on the advantage of forests to the community, delivering lectures at elementary schools, planting city roadside trees, to help create a better informed public. For one of the conceivable factors causing excessive forest destruction is, precisely, a lack of cooperation from society, and this, in turn, obviously results from the failure of society to supply itself with the proper information.

Chongrok Prichananda
(Dean, Faculty of Forestry
Kasetsart University, Bangkok)

family is allotted 10 rais (1.6 hectares) a year for clearing and tree planting. In between the rows of tree seedlings, which are usually spaced 4×4 metres apart, they may plant any cash crops they wish. If the tree seedlings have a minimum survival of 70 percent at the end of the year, the family also receives 60 baht (US\$3.00) per rai, in addition to the proceeds from the sale of their own cash crops. If a family works industriously for three consecutive years on an area of at least 30 rais (4.8 hectares) they earn a bonus of 1 500 baht (\$75.00). From then on, for every additional year they work the annual allotment of 10 rais they are paid an extra 500 baht. The officer-in-charge is also requested to keep the members of the village informed about market conditions and prices for their crops, and he may assist them in transporting their products to market. There are other benefits as well. After a house is built it is supplied with water and electricity. Children are entitled to free education in the village primary school, which is also under the sponsorship of the Forest Industry Organization. A doctor or nurse will visit the village to advise on sanitary conditions and to see to the health of family members.

To ensure continuity of employment, labour for a whole range of forestry tasks — tree nursery work, weeding,



A COMMON ASIAN LANDSCAPE, DEFORESTATION BY SLASH-AND-BURN M
after a year of rice, centuries of weeds

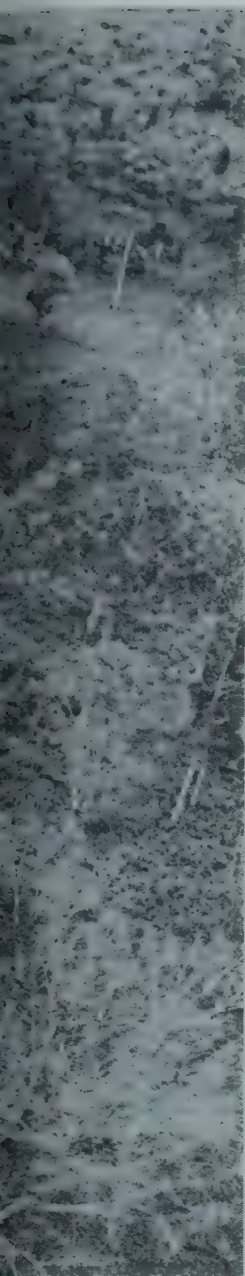
"... the human factors ... require flexibility, un

In northern Luzon, the main island of the Philippines, the Forest Service has two ways of dealing with squatters who practice shifting cultivation. Some are allowed to remain, while others must move but are given a choice of locations where they may legally settle. All are assisted in various ways as a means of encouraging permanence and stability.

Rosalio B. Goze, District Forester in Luzon's Upper Agno river basin, is in charge of three sites where he deals with the settlement of shifting cultivators. He believes that the approach is succeeding, but emphasizes that the human factors involved require flexibility, understanding and patience from officials. About 80 percent of those who traditionally practised shifting cultivation in this area have been settled officially. The problem will now be to keep them settled.

When families are officially settled they are given leases and the land involved is declassified. They can use part of their holding for growing crops, must agree to desist from illegal cutting and are promised paid work in forestry. Cabbages, carrots, potatoes, and *pechay*, a Chinese vegetable which resembles an open cabbage, are the main crops grown. As a result of the nationwide martial law in September 1972 severe penalties have been imposed on unauthorized logging.

This combined settlement and reforestation work in northern Luzon is also being assisted by the FAO/UN World Food Programme (WFP). Over the past six years the food aid investment here has totalled US\$734 000, used mainly as part-payment to settlers for tree planting and other forestry work. The same people who have made barren of vege-



A FARMER IN THE PHILIPPINES ENGAGED IN REFORESTATION
it also means an income

pruning, thinning, pesticide spraying — is recruited from families registered in the village, and this adds substantially to the level of income.

But useful as the forest village system can be, those who attempt to put it into effect should not be overly optimistic. Persistence, patience and an understanding of human nature are required. In regions or countries where unutilized lands are still plentiful and where, regardless of laws, people can still take possession of land merely by settling on it, it is not easy to institute forest villages, even though the economic and social advantages may seem obvious.

Meeting traditions

The forest village system can fit into the traditional way of life of shifting cultivators because it allows them to move on periodically, clearing new land as they are accustomed to do, but at the same time it develops a kind of society in which the nomadic life is discouraged. Scattered groups of people, nomadic by nature and tradition and therefore difficult to control, to guide and to educate, can be drawn together to form strong and orderly societies, and these societies can provide important labour forces for the benefit of the forests instead of their wanton destruction. ■

Understanding and patience from officials "

RIFAT ALWI

tation the river banks, causing serious erosion and flooding, are now replanting these slopes with seedlings. Between 5 000 and 6 000 families were rehabilitated under this project, and 8 000 hectares of forest land saved from almost certain slash-and-burn destruction.

Visitors to this area can see families working for from eight to ten hours a day in groups of about a dozen, climbing up and down the hills with bags full of Banguet pine seedlings. About 45 000 million seedlings have been planted in the three forest districts of Itogen, Ambuklao and Baguio, and many kilometres of forest trails have been cut, roads maintained and check dams constructed to stop erosion and flooding.

Vincente C. Magno is the forester in the area in charge of fire prevention and control, and like most fire wardens

he believes in punishment for those who set forest fires. Contrary to past practice, prison sentences are now being handed out. They are not severe, however, as clearing forest to plant food crops is hardly a crime in the minds of people who have always existed this way. Between 1972 and 1974, 20 persons were sentenced to one week in prison — an example more than a punishment — after which they were made to promise that they would no longer engage in illegal forest burning and would set to work planting seedlings in burnt-out areas.

The combination of law enforcement and fire prevention, using firebreaks and lookout towers, has resulted in a reduction in the number of forest fires from 189 in 1973 to 50 during the first six months of 1974, and these latter fires were much less damaging than those in the past. ■

SCIENTIFIC IMPERIALISM

Scientists from developed countries descend upon developing countries to collect, "protect" or capture and take home flora, fauna and professional prestige. They often succeed only in making problems for themselves and their local scientific colleagues. What ought to be recognized is that every country has the right to utilize and present to the world its own scientific resources.

The word "imperialism" has a subjective connotation and in general is used to describe the exploitation of one group by another. Scientific imperialism originates from the fact that more often than not a country that possesses certain resources, valuable for scientific reasons, does not have the means to use or conserve them properly, and receives little benefit from their exploitation by others.

Scientific imperialism is a widespread phenomenon today and takes many different forms. Because it is "carried out in the name of science" it may seem to be justified automatically, and any protest may be stifled by strong criticism.

A typical instance of scientific imperialism may be as follows: a very interesting natural forest area for collecting and field observation is found in a developing tropical country which has little comprehension of "basic" science. It is concentrating all its efforts on trying to solve its staggering food, health and communication prob-

lems. Shifting cultivation on marginal land is gradually encroaching on and destroying the natural forest area. Scientists from developed countries move in and collect in the name of science, with the conviction that if they do not collect as quickly as possible nothing may remain. The resentment of local scientists and other officials from the developing country gradually builds up against the "foreigners".

Access denied

Justified or not, it must be recognized as a natural reaction. Eventually, foreign scientists may be denied access and permission to go on collecting. But local scientists may not be able to protect the disappearing scientific material. Ultimately, the whole area may be lost, either through a continuation of the piecemeal encroachment or through road-building leading to forest clearing. A good part of it may later revert to useless secondary scrub. Quite often an aggressive invasive grass takes over, and a drab landscape remains with very little value for collecting or scientific observation.

A different attitude by the visiting scientists could have prevented this trend; in fact, a carefully planned approach could have led to a programme

of assistance in developing the resource to the ultimate benefit both of the country concerned and of the foreign scientists.

The crudest form of imperialism is often practised by the explorer-observer-collector from a developed country who discovers a new area which has not been intensively investigated by scientists. He collects specimens which he sends to well-endowed foreign museums and other institutions, where they are studied, mounted, identified, described and illustrated for scientific and other purposes. Historically this is the oldest and best documented approach, and the reputation of many scientists and their institutions, indeed the advancement of science, can be traced to it. Nothing appears to be wrong with this traditional approach, but in today's world it is likely to arouse much resentment which could be avoided. Indeed, with very little additional effort much more could be achieved without embittering the scientists of the developing country. It is easy to appreciate how they might be upset, particularly if they are not participating. Even if no local scientists exist, future generations may feel resentment and influence policies accordingly.

Of course, collecting specimens and

Gerardo Budowski, a forester, is the Director-General of the International Union for the Conservation of Nature and Natural Resources (IUCN).

sending them to the best places for identification and mounting are necessary and desirable; but action should not stop there. There should always be some intent to help the host country to build up its own facilities, encourage its own museums and curators or equivalents, and improve its own library service. It has to be admitted that herbaria and other collections are often kept in very unsatisfactory conditions, and that libraries are poorly serviced. Nevertheless, such help whenever and wherever offered has proved to be worthwhile in every respect.

Field expeditions should always be organized so that local scientists can actively participate. Ultimately such a policy will greatly benefit science. Future collectors coming from foreign countries are more likely to find ready access to good local collections and libraries, and they will encounter local experts willing to make their work easier, more profitable as far as results are concerned, and finally more economical.

Strong reactions

However, collection alone, without the strengthening of local facilities, will sooner or later produce a strong reaction among indigenous scientists who are often frustrated because of lack of facilities, lack of recognition at home and abroad and, more than anything else, lack of opportunity. They may even be able to force an embargo on "foreign" collecting, as has already happened in some countries. Collecting without considering the needs of the country is a short-term approach for relatively narrow benefits which may dry up the resource.

Scientists working in another country, with a background and training derived from a different environment,



EUROPEANS AND AFRICANS AT A SAVANNAH EUCALYPTUS PLANTATION
underneath the baobab tree



EXAMINING AERIAL PHOTOGRAPHS WITH A STEREOSCOPE
a gift is not forgotten

have a tendency to "discover" some of the scientific facts of the new country and present them as a great novelty to fellow scientists of their own culture, and sometimes even to the general public. The novelty of their discovery may, of course, be enhanced by excellent photographs and some interesting anecdotes or details. For the type of audience for which the publication is intended — people who have a background of training and culture similar to that of the author — the discovery may be interesting, or even sensational. But in the country where the field research was carried out, the scientific community and the general public, with a different viewpoint and knowledge, may feel that the presentation is twisted. They may resent the fact that the subjective presentation does not correspond to the scientific evidence.

Sometimes no credit is given to local

authors of writings on the same subject which may have appeared in lesser known publications, or in local newspapers. Foreign publications dealing with a developing country often receive wide publicity in that country and may be translated and reproduced in the local press. Various undesirable reactions are generated, and there may even be a tendency by scientists or science writers in the country to imitate the foreign interpretation. They can become very good at it but gradually may become aliens within their own culture. Whatever the outcome, the result is again detrimental to the advancement of science.

There are two remedies, depending on the type of publication. If it is obviously not intended to become a scientific reference and is directed to a particular alien audience, this should be clearly noted in the introduction. If, however, it is a scientific publica-

foreign scientists show fauna in the countries

tion, a great deal of care should be taken to present as objective a picture as possible. Admittedly this is not easy unless consultations with local scientists take place and the utmost tact is used. The involvement of local scientists or scientific writers, for instance as co-authors, may be very desirable. Such a potential co-author may be able to translate the paper and adapt it to *his* audience, thus multiplying the impact.

Clichés

The broad, superficial generalizations by expatriate scientists who try to fit a country or region into a certain category, from which it later derives a label, is another case of scientific imperialism. Far too many statements and publications are based on short observations and this has given rise to sweeping generalizations which often condemn or glorify the country or region beyond reality. The stereotyped general picture which emerges may take a long time to throw off, even after more comprehensive and detailed studies are made. A classical example is the description: "...hot, steaming, almost unbearable environment," attached to many tropical countries, a theme with unfortunately large variations. How the people living in the area adapt, that there are nearby mountains that are cooler, or simply that the capital's climate is not the whole country's climate, are facts that are completely overlooked. Again, a specific country has been described as having by far the richest flora and fauna of a whole region, when what has happened is that this particular

support local institutions and scientists so as to preserve flora and
origin... not to do so is to go against their own interests

country has attracted the earliest or largest number of botanists or zoologists. The consequence is that successive scientists schedule their visits there; their efforts become progressively less rewarding, while they disregard neighbouring countries that may have an equally rich flora or fauna, and badly need direct or aided scientific research.

The remedy, as has already been implied, is to adopt a much more careful and factual attitude when describing observations and collections, and to promote all possible action that may lead to a build-up of local facilities.

Local assistants

Many scientists enter a foreign country with letters of introduction, or their impending arrival may be announced by others. Their reputations have been well established through publications or other endeavours; consequently they are often grant-aided. Moreover, they frequently request, and are granted, local assistants, usually bright young people who are taken away from the day-to-day functions which have been entrusted to them. Such assistants will often be very keen to leave their routine jobs and accompany the distinguished visiting scientists for what is likely to be a most interesting assignment. Their assistance and knowledge of the language and customs are generally very valuable to the visitor. Sometimes there is a rewarding follow-up for the assistant, such as improvement of his status, the inheritance of materials, such as books or instruments, or even a fellowship. More

often, however, it leads to nothing of the sort. Although the help of the assistant is sometimes acknowledged in a publication, such mention is frequently buried in a list containing many names, some of them those of bureaucratic functionaries who had little or no involvement with the study. At worst, the assistant is completely ignored. This is very painful for him, since he has often been essential to the success of the mission, for instance by being able to identify the common names of plants and animals, by advice on the usages and customs of the people in the area, and by providing otherwise inaccessible information.

The obvious remedy is to build up the status, knowledge, and ability of such assistants for future constructive work so that they have the feeling that their short-term association has been of benefit both to themselves and to their country.

Relative luxury

As we have briefly mentioned, visiting scientists often arrive on missions with grants or full financial assistance for the work with which they are entrusted. Sometimes they bring graduate student assistants with them, or even their wives. Properly funded and staffed, they are a striking example of the careful preparation made by the country or organization that sends them. But from the point of view of the receiving country, this may be regarded as extreme luxury, particularly by the local scientists who are almost always short of status, transport facilities, assistants, equipment, libraries and financial rewards. The

result is widespread resentment, often compounded by ignorance of the language and customs of the visiting scientist and his entourage.

Overpaying

The remedy here is to avoid bringing an assistant, to use local facilities as much as possible and pay for them, not only in money but also in instruments, books and other items which can be used for the improvement of the prestige and facilities of local scientists. There are always some local scientists; it may take some time to locate them but it will be time well spent. Ostentation of any kind should, of course, be avoided.

Overpaying for local services is a common peccadillo which often disrupts traditional patterns and customs and rarely creates a feeling of long-lasting gratitude. Paying too much for the supply of specimens, excessive tipping and paying for small favours considered traditional and free by local populations are all particularly damaging. There is simply no reasonable excuse for overpaying. It creates animosity and a damaging feeling of competition and resentment among visiting fellow scientists who do not overpay; even worse, it antagonizes local scientists, who not only cannot afford to imitate their foreign colleagues but often think that this is immoral and corrupt. The simple remedy here is to find out what is the just price or the right attitude when it comes to making a choice.

Many countries are clearly not well organized for scientific research when compared with American or

the visitor has an important advantage, not having taken si
considered neutral, or a potential ally to all... he should retain t

European standards. This is particularly true when it comes to transportation. Vehicles used by local field personnel are almost always in short supply. When repairs are needed it may take a long time to obtain parts and get them fitted. Moreover, they often represent a status symbol to local users. Visiting scientists should be particularly circumspect in accepting courteous and matter-of-fact offers to help them with a vehicle. The least they should do is cause the least possible inconvenience. Sometimes it may be appropriate to offer compensation, in the form of payment or gifts.

“Within a few days”

Europeans and North Americans are not usually accustomed to the subtle ways that can be employed to say “no” when they request free transport; for instance, a vague promise to find a vehicle “within a few days.” Whenever possible it pays to hire local facilities, expensive as they may be, rather than request transport from government or local institutions. Much could be said about the misunderstandings and abuses that have occurred in this connexion which constitute an endless source of friction.

It is quite common for different scientific expeditions with similar or related objectives, such as collecting specimens or studying natural ecosystems, to visit a developing country at more or less the same time. While everybody agrees in principle that much could be gained by coordinating efforts and joining forces, this is seldom done.

Sooner or later animosity develops.

Not only is there an unavoidable duplication of effort and expenditure, but among the local inhabitants — in particular the scientific community — it can cause misunderstanding and mistrust. Local administrators often learn how to play one group against another. Much more could be said about this unfortunate habit. Although it would appear elementary to investigate what others are doing in the field and how the country actually reacts to their aims, this is seldom done.

In some countries there is an office which handles scientific requests. Sometimes it covers a particular area of the country. For instance, in Ecuador the Galapagos Islands has the Charles Darwin Foundation as a co-ordination bureau. Very often, however, such a clearinghouse does not exist, and it is necessary to find other sources of information.

Every scientific expedition, or single scientist, should do everything possible to inquire about other groups and establish contacts *before* actually arriving in the area under study. A proper liaison is obviously and urgently called for, and again everything should be done to dispel mutual ignorance or mistrust.

Alien standards

Visiting scientists bring with them their methods and technologies and, more often than not, are imitated locally, consciously or otherwise. Many feel they have the right to demand of their paid or unpaid local assistants that they work according to their own alien standards. This

can give rise to a great deal of confusion. For instance, some Central American countries have been changing from metric measurements regarding forest inventories to British system measurements because of North American influence, only to come back partially to metric measurements because of later FAO influence. Other examples of annoying changes that can be traced to foreign influence involve filing systems in libraries and testing methods for building materials.

Technology

Certain technologies will be readily imitated, often with disastrous effects. Efficient hunting traps are now so widespread in certain tropical countries that they have led to the practical eradication of some species. The same applies to more efficient guns and other killing devices. Collectors of small tropical fish in the Amazon area have introduced special fishing techniques; a multi-million dollar trade has developed — benefiting the importing countries — which is leading to the depletion and perhaps the extermination of certain species and, finally, of the trade itself. While it may be argued that the introduction of new technologies can lead to additional income for the local people, scientists have the duty to look to the long-term interests and, if their new technologies fall on cultures that cannot use them without destroying the very resources on which such trade is based, they should take the utmost precautions in providing what, at the present time, are extremely dangerous tools.

n local rivalries, he is
advantage

At a proper time it may be quite appropriate to introduce these technologies. That time is when the populations that benefit from such technologies are fully prepared to use them wisely on a truly permanent basis for the right kind of development, one that does not jeopardize the possibilities of keeping the choice of options open for future generations. Since many scientists from developed countries are now "conservation-oriented" they should be cautious of the influence they exert on other cultures, which have not yet been so exposed to shrinking resources, pollution and erosion. This demands extreme care in the introduction of new technologies.

The obvious remedy is to take a long-term approach that will ultimately benefit the country itself and therefore its scientific progress. As a general rule, disruption of local customs should always be very carefully avoided.

Who to see

Upon arrival in a developing country scientists often find it necessary to gain the support or approval of key local people. Letters of recommendation may not be directed to the right people, since changes in the administration in developing countries are usually frequent.

Efforts to make useful contacts are legitimate and quite appropriate as long as the contacts are the right ones. Support may be offered by what appear to be heaven-sent emissaries. But how does one know with whom to become connected? To whom to present one's letters?



A TREE NURSERY AND ROMAN RUINS IN DJEMILA, ALGERIA
not all in the past

Rivalries, intrigues, organizational clashes regarding competence in certain fields exist in every country, whether developing or developed. Sometimes these land mines are out in the open and easy to recognize but still difficult to avoid treading on, and sometimes they are invisible to the foreigner, buried under indigenous subtleties. Everything must be done to avoid being involved in local and often very subtle issues, particularly those connected with clashes of personalities. Local attitudes toward the government or the military authorities, for instance, may be very different from those in the scientists' own countries. Laws and regulations often have different ways of being obeyed. It is obviously impossible to learn all about complicated balances of power and other aspects of local politics, but certain rules are worth while following.

Above all caution is essential. Per-

sonal interviews with different key people are always very rewarding, however time-consuming they may be. It does not pay to visit only one official and ignore others. These calls are more than courtesy or duty calls. Other pitfalls need to be avoided. It is usually a mistake to take as a main adviser a local scientist who happens to be well known for his strong opposition to the government, however good he may be as a scientist. A neutral one would be much more indicated for a foreign visitor, while friendly contacts should be maintained with others.

The newly arrived scientist has one important advantage. He has not yet taken sides and therefore is considered neutral — or a potential ally — and will be well received everywhere. He should by all means maintain this vantage point.

Visiting scientists sometimes find



A VEHICLE PROVIDED BY UNDP FOR A FORESTRY PROJECT
there can be misunderstandings

themselves making public or official statements before they are aware of the implications of their declarations. To make a press statement on the potential of the untapped resources of the country without knowing all the relevant factors, which may include complicated social, political, cultural and economic considerations, is poor judgement. But to do so when local scientists have been trying to say the same things without reaching the ear of the relevant minister, and without any local publicity or recognition, will compound the mistake and make instant enemies out of potential allies.

Foreign scientists should understand that they themselves are news, or at least novelties. They often enjoy special courtesies and are granted immediate audience by ministers or presidents, although local scientists are rarely listened to, or must go through

a painful and wasteful period before they get the attention of higher authorities or obtain good press coverage. No press interview, no visit to a minister, should be arranged before consulting with local scientists. A request for advice as to subjects to be brought to the attention of the minister, the press, or a television or radio audience will usually be very gratefully acknowledged.

Scientific imperialism is, at present, on the increase. It is argued that collecting must be carried out as rapidly and as massively as possible in order to preserve, at least in museums and zoos, what once constituted a rich heritage of plants and animals. However, while natural resources of great scientific importance are being rapidly diminished by overpopulation and the destruction of large tracts of natural areas, collecting massive quantities of scientific material is by no means the

only or most desirable way of dealing with the problem.

Foreign scientists have a duty to promote the creation of local structures and the recruitment of local personnel to deal effectively with local resources. Above all, appropriate natural areas should receive, as soon as possible, the status of protected scientific areas, or be set aside as national parks or equivalent reserves.

The proper allocation of financial and other support for the benefit of local "progressive conservationists" is probably the most productive procedure to follow for visiting scientists and the organizations which sponsor them. If such conservationists do not yet exist in a particular country, they should be encouraged as a top priority.

All the glory

It should not be forgotten that the cry against scientific imperialism usually comes from young, vociferous and often ambitious scientists who see foreigners getting all the glory. Whether or not it is justified it must be recognized, and local scientists must be given a fair opportunity to achieve recognition. In the developing countries the gap between the "haves" and the "have nots" needs to be bridged as much in science as in other aspects of life. The recognition that every country has the right to utilize its own scientific resources, and proudly present them for the benefit of the rest of the world, should be in the mind of every scientist who goes to another country. This is not to say that visiting scientists should desist from their original mission or expedition. They are needed, sometimes very badly, but they should understand that their involvement in scientific inquiry will influence local people and structures to a much greater extent than is usually anticipated. They should be prepared to meet this challenge intelligently and tactfully, and arrange to carry out their trip accordingly.

In the meantime, a code of ethics, adapted to specific conditions, needs to be adopted by visiting scientists. A good move in this direction — guidelines for biological field work — was published in *Science* in 1970 (Vol. 169, p. 8).

explaining forestry to forest users

The reasons why forests are used in one way or another need to be publicly explained in terms which the public can understand

The multiple use of the forest resource inevitably increases public interest and even involvement in the manner in which the forest is managed.

People use timber, traditionally the major product of the forest, in its various forms, but they obtain it usually well down the chain of supply, at a

point remote from the forest itself. Provided the timber or other forest product is available in the form or dimensions required and at a reasonable price, they are not particularly concerned how it is obtained; this is a matter for the forester and the timberman.



NICARAGUAN TEACHERS, MOTHERS AND CHILDREN VIEW A FORESTRY FILM
forming opinions

But as soon as the forest is recognized as providing other benefits, such as water and recreation and beauty, then people become directly interested in what is happening in, and to, the forest itself. And it is at this point that forest managers should be actively participating in what might be termed a public relations programme, but which in fact should go far beyond public relations to encompass education in, and explanation and interpretation of forestry in all its aspects, and usually also to include continuing contact with the public to determine their preferences, desires and ideas.

The first and most important point to make is that public relations are useless in the absence of performance. The forest manager must not only say what he is doing, and why, but his statements must be borne out in the forest. Again, forest managers, and the people who work for them or under their supervision, are 'doers' and they are human. As such it is only to be expected that they will on occasion make mistakes. When this happens the forest manager should be prepared to admit that an error has occurred, and he should learn from his mistake and take the appropriate steps to ensure that it does not occur again. In brief he should be frank, and he should match his words to his deeds.

Matter of taste

Forest managers should realize that many people, visiting a commercial forest for the first time, will be shocked by the appearance of a current logging area. Some may be exhilarated by the roar of heavy logging equipment, by the crash of falling trees, by the smell of exhaust fumes and of freshly cut timber and of soil churned up by the tractors, by all the activity that is associated with logging. But many will find it ugly or distasteful. The forest manager should not be surprised at this, but should be prepared to explain, by all appropriate means, that this is only part of the process by

This article is taken from the report of the Australian "For Wood Conference" held in April 1974.

which forests are managed and timber reaches the user. The situation is of course not unique to forestry: an abattoir is hardly as attractive as a herd of Herefords grazing in a lush, tree-shaded pasture.

This matter of explaining, or of interpreting, can be carried out in various ways, both in the forest or out of it: it can be done by brochures and pamphlets, by displays, by talks and lectures, by articles in the press, by guided tours, by information boards. Although it deals with forest problems and with forest management, it is often a task for the professional communicator: the educator, journalist, graphic artist and photographer. It has to be done in a way that is understandable and interesting, and that again can be related to what can be seen in the forest itself.

A two-way affair

Multiple use brings the forest manager into direct contact with a large number of the public who seek to use the forest for a variety of purposes. Efforts should be made to ensure that communication with these people is a genuine two-way affair: that not only do the managers advise and instruct the visitors about the forest, but that the visitors have the opportunity to express their views and ideas, with some likelihood that sound ideas, reasonably presented, will be heeded and considered. Some approaches to this question include the establishment of advisory committees in certain forest areas that receive considerable public use; periodic consultation with special-interest groups or associations that make frequent use of the forest — recreational, sporting or natural history groups, for example; and, of course, the various visitor-sampling techniques that provide the basis for a constant stream of technical papers on forest recreation.

The point is that avenues that will help the public to identify itself with forest management should be explored and developed, as should any avenues that will assist the forest manager to understand and appreciate better the role of those who seek to enrich the quality of their lives through their use of the forest. ■

measuring soil moisture stress

H. Tschinkel

The author gives a simple, practical method for measuring soil moisture stress, shows when it may be usefully applied, and summarizes some recent writings on the subject.

The measurement of soil moisture content, as well as the force with which moisture is held by the soil, is an important aspect of watershed management and hydrology. The assessment of this force, commonly referred to as soil moisture stress, is essential for meaningful interpretations of the soil moisture used by plants. Unfortunately, the lack of a simple method of measurement has been a serious obstacle for hydrologists and those involved in watershed management. It is my purpose here to summarize a recently improved method for measuring soil moisture stress through the use of filter papers and to list some of the applications, since these are quite scattered in hydrology writings.

McQueen and Miller (1966, 1968) revived and improved a method described by Gardner in 1937, which measures the soil moisture tension based on the amount of water absorbed by filter paper in contact with a soil sample. Apparently independently, Fawcett and Collis-George (1967) tested an almost identical method and came to very similar conclusions. The procedure for the method described by McQueen and Miller is as follows:

A soil sample is extracted and placed in a soil sample can. A disc of a particular brand of filter paper is placed in contact with the sample and the can hermetically sealed with plastic tape. The can is then stored at 20°C for two to three weeks during which time the

filter paper reaches moisture equilibrium with the soil. The paper is removed from the can, and its moisture content put against a calibration curve gives the moisture stress of the soil sample in bar or in pF units. The degree of moisture can be easily obtained, and the only expensive item of equipment, an analytical balance, is available in most laboratories.

There are two applications of this method:

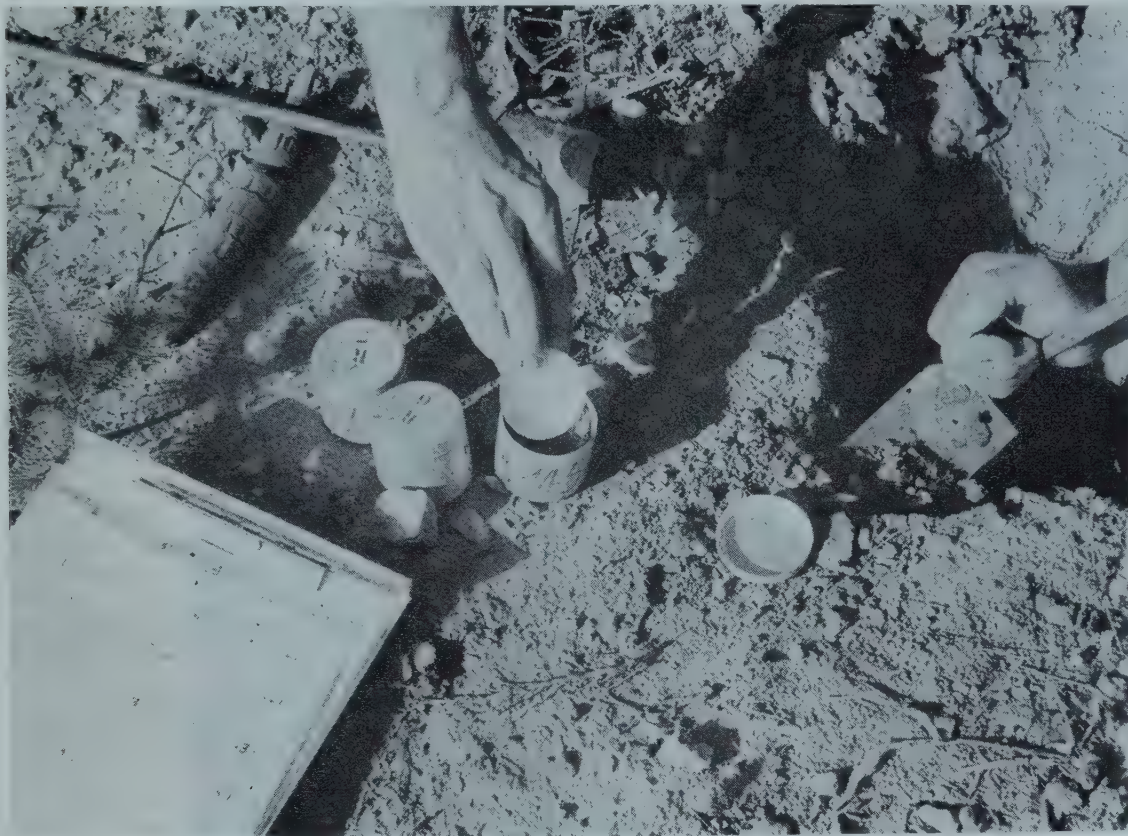
1. It may be applied to measure the moisture stress of a particular point in the soil at a particular time. Thus, Branson, Miller and McQueen (1965, 1970) used soil moisture stress measurements to help explain the distribution of plant communities in two arid regions of the United States. Herrmann (1970, 1971) studied the water balance and variations in moisture stress under several vegetation formations in tropical mountains. Miller (1969) used the method to study changes in soil chemistry due to drainage of water through the soil. McQueen and Miller (1972) measured soil moisture content and stress under riparian vegetation in order to describe mechanisms of moisture retention and migration. I used the method (Tschinkel, 1972a, 1972b) to determine whether high soil moisture stress during the dry season might explain the poor growth of *Cupressus lusitanica* plantations on ridge sites. At present I am applying the method in the semiarid mountains of Tunisia to assess the effect of site preparation on soil moisture stress, and to evaluate relationships between soil

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moisture stress during the long summer drought and the regeneration of *Pinus halepensis*.

2. The method may be applied to construct soil moisture retention curves, i.e., the relationship between moisture content and moisture stress, which is an important hydrological constant of a soil. Derivation of these curves, or certain points on them (usually chosen to correspond to field capacity or the

cedure for deriving these curves with the filter-paper method (Tschinkel, 1972a) and have applied the procedure to their data. The calculations can be made either with a desk calculator or with FORTRAN programmes and regression techniques for curve fitting. Recently Miller and McQueen (1972) derived relationships that can be used to estimate quantities of moisture in soils at different levels of moisture stress. An article by the same authors



Filter paper discs stored with soil samples for 14 to 21 days are used for soil moisture stress calculations.

permanent wilting point), is arrived at laboriously in the customary methods using tension tables and pressure plate apparatus — equipment, moreover, which is often not available in developing countries. Williams and Sedgley (1965) used a filter-paper method to estimate the 15-atmosphere percentage of soils, and Fawcett and Collis-George (1967) expanded that method to construct entire soil moisture retention curves. Del Valle and Cadavid (1970) who tested the variability of McQueen and Miller's method also constructed soil moisture retention curves for several profiles of soils derived from volcanic ash. I have outlined a practical working pro-

cedure for approximating soil moisture retention curves from limited data is in press. ■

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Is this your kind of forestry?



The FAO Forestry Department is always looking for foresters and specialists in forest industries for projects throughout the developing world. FAO foresters are selected on the basis of their professional skills fitting the needs of projects. Applicants should have at least five years of professional experience together with the ability to adapt to local customs and conditions and to work as part of international teams with officials of the countries served by FAO. Assignments are usually for one to three years, with prospects of extension. Occasionally, FAO needs to fill short-term assignments of up to six months.

The Forestry Department wants to build up its bank of qualified, available personnel from throughout the world so that the requirements of field projects may be matched with the right people as rapidly as possible. For application forms write to the

Personnel Officer,
Forestry Department (FODX),
Food and Agriculture Organization
of the United Nations,
Via delle Terme di Caracalla,
Rome 00100, Italy.

Candidates will be informed of employment opportunities after their applications have been evaluated.

Some categories of posts in the field

Experts in

Watershed management

These posts deal with the evaluation and management of forest resources including:

- Carrying out surveys of forest watershed areas; the collection of quantitative data and determining the main problems encountered, particularly torrents, erosion and siltation.
- Advising on proper forest land use practices including torrent control and overall watershed rehabilitation measures, and establishing demonstration areas.
- Carrying out biological and engineering work to rehabilitate degraded forest watersheds.
- Training local staff in surveying, compilation of data, project formulation and execution

Qualifications: University degree in forestry, including watershed management and hydrological training with five years' experience in practical watershed management work.

Languages: Good knowledge of French or Spanish and a working knowledge of English.

Experts in

Forest economics and marketing

These posts range widely in their nature from undertaking specific tasks such as:

- Estimating costs of producing wood from plantations.
- Advising on stumpage sales and concession agreements.
- Lecturing at seminars on economic planning.
- Planning and conducting wood consumption surveys.
- Locating market outlets for particular products.
- Participating in the formulation of a national development plan.
- Developing a national statistical programme for the forest sector.
- Undertaking economic analysis of the forestry sector.
- Examining past trends and future prospects for wood supply and demand.
- Participating in river basin or regional socioeconomic studies.

Qualifications: Degree in forestry or economics with at least five years of experience in applied forest economics. Graduate training in the field is desirable.

Languages: Good knowledge of English, French or Spanish. A knowledge of one other of these languages is desirable.

Experts in

Mechanical forest industries

A variety of specialist posts are required in mechanical forest industries. These posts are related to the establishment, restructuring and improvement of sawmilling, wood preservation, plywood, veneer, blockboard, particle board, fibreboard, charcoal, etc., and other primary mechanical forest industries. They involve, among other tasks:

- Technical and economic evaluations of raw material supplies and assessments of markets.
- Surveys of existing industry.
- Feasibility studies for industrial projects.
- Organization of research and testing programmes.
- Advice on equipment.
- Training of local personnel.

Qualifications: University degree in wood technology, engineering (or equivalent) and at least five years of practical experience. For some posts technical training with ten years of practical experience may be required.

Languages: Good knowledge of English, French or Spanish. A knowledge of one other of these languages is desirable.

Experts in

Logging, transport, road construction and equipment

These posts, which vary in type and degree of responsibility, are related to improvement of logging and transport systems and technologies with due regard to socioeconomic conditions and needs. Duties may include the following:

- Policies in the forest services and enterprises with respect to responsibilities for administration, planning, execution and control.
- Technoeconomic surveys of accessibility of forest resources, including costings of work operations.
- Surveying and planning logging, forest road networks and long-distance transport of wood and wood products.
- Planning and execution of pilot operations to introduce and demonstrate adequate technologies and equipment.
- Promotion of research, methods and work study, equipment development.
- Training of local staff at the professional and technical level.

Qualifications: Degree in forestry with qualifications in logging and related transportation and preferably not less than five years' experience.

Languages: Very good knowledge of English, French or Spanish and working knowledge of one other of these languages.



If
a forest
could speak...

...it would
ask you
to read

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THE WORLD OF FORESTRY

BROAD PROGRAMME SET FOR FAO/IUFRO MEETING ON FOREST DISEASES AND INSECTS

The Second FAO/IUFRO World Technical Consultation on Forest Diseases and Insects will take place from 2 to 18 April 1975 in New Delhi, India. The last meeting was held in July 1964 in Oxford, United Kingdom. A wide range of subjects has been scheduled for the New Delhi meeting and the working sessions will be preceded and followed by study tours arranged by the Forest Service of India.

The schedule is as follows:

Arrival of delegates in New Delhi 2 April

Pre-Consultation study tour 3-6 April

Working sessions 7-12 April

Post-Consultation study tour 14-18 April

Working Sessions

MONDAY

Registration

Opening session

1. Status of diseases and insect pests in Eurasia and Africa.
2. Status of diseases and insect pests in the Americas, New Zealand and Australia.

TUESDAY

3. Quarantines — recent advances and current needs.
4. Environmental policies and pesticide legislation.
5. Effects and amelioration of air pollution damage on forest ecosystems.
6. Entomology and pathology of wood in use and in storage.

WEDNESDAY

7. Detecting forest insect pests and diseases.
8. Evaluating impacts of damaging insects and diseases.
9. Predicting changes in incidence and damage of insect pests and diseases.

10. Cultural and genetic controls to reduce insect and disease problems.

THURSDAY

11. Control of insect pests by predators, parasites, and pathogens.
12. Biological control of diseases.
13. Control of insect pests and diseases with behavioural and toxic chemicals.
14. Integrated management of forest insect pests and diseases.

FRIDAY

15. Diseases and insect pests of fast-growing trees for developing countries — softwoods.
16. Diseases and insect pests of fast-growing trees for developing countries — hardwoods.
17. Emerging insect and disease problems in urban, recreational and protection forestry.
18. Improving effectiveness of education, research and application organizations.

SATURDAY

19. Improving effectiveness of communication of pathological and entomological information.
20. Needed improvements in forest entomology and pathology; formulation of symposium recommendations.

Discussing tropical forestry in the United Kingdom and West Africa

Two international meetings on the variation, breeding and conservation of tropical forest trees will be held in close succession between 17 April and 2 May 1975, in Oxford (United Kingdom) and west Africa.

The Oxford Joint Symposium will examine the application of existing knowledge to tropical forest programmes and methods of genetic conservation. It is

sponsored by the Linnean Society of London, the International Union of Forestry Research Organizations (IUFRO) and the Commonwealth Forestry Institute. It will take place at the Department of Zoology, South Parks Road, Oxford, 17-19 April, with a field trip on 20 April.

The IUFRO Workshop Nigeria/Ghana will open on 21 April in Ibadan, Nigeria, moving to Accra, Ghana, on 29 April and closing on 3 May. Its object is to share experience in tropical hardwood genetics and to review the progress and problems of west Africa's forestry through seminars, lectures and field tours.

The workshop is organized by Nigeria's Federal Department of Forest Research and Ghana's Forest Products Research Institute.

The following are the main subjects to be covered:

- Range and variation of indigenous hardwoods: their distribution patterns.
- The natural tropical forest: structure, composition and variation.
- Breeding of *Triplochiton* and *Terminalia*: distribution patterns, phenology, plus-tree selection, seed collection, handling and storage, vegetative propagation.
- Breeding systems: flower morphology, seed collection, handling and storage, and progeny testing of teak.
- Plantation silviculture of tropical hardwoods, including *Terminalia*, *Triplochiton*, teak, gmelina, *Cedrela*.
- Utilization of tropical hardwoods.

The International Union of Societies of Foresters is growing

In August 1974 some 200 delegates and observers representing professional societies of foresters from 30 countries met in Helsinki for the Second Congress of the International Union of Societies of Foresters (IUSF). Discussions dealing with professional ethics and education dominated the sessions. Forestry educators were particularly well represented, and a one-day International Consultation of Forestry School Executives was held on the day before the opening of the Congress (see Education page).

During the sessions, as well as on study tours arranged by the host organization, the Finnish Society of Foresters, participants showed particular interest in problems of continuing education for foresters and in training for skilled forestry workers. Finnish Government training centres for skilled forestry workers were visited during study tours to Lapland and the eastern lake district of the country.

In an address, Dr. V.L. Harper, President of IUSF, noted that the organization has grown from 11 societies at its founding in 1969 to 19 today. There are some 40 national professional forestry societies in the world.

IUSF publishes a twice-yearly newsletter, a directory listing names and addresses of its member societies and their officers, a world directory of professional forestry societies, and a world directory of professional forestry schools.

It has two standing programme bodies, a Commission on Forestry Education and a Committee on Responsibilities to the Public.

Inquiries concerning IUSF should be directed to:

R.Z. Callahan
Executive Director, IUSF
U.S. Forest Service
Washington, D.C. 20250, U.S.A.

Readers' letter

Experience with immobilized deer and aggression

We wish to commend Schürholz on his detailed interpretations of behavioural changes in a red deer (*Cervus elaphus*) herd following immobilization of one herd member (*Immobilizing a wild animal changes the behaviour within the group*, by Götz Schürholz, *Unasylva*, summer 1974). We have observed two instances of apparent aggression toward immobilized white-tailed deer (*Odocoileus virginianus*). Both instances occurred following immobilization with succinylcholine chloride. One instance involved a female fawn (approximately eight months old) which was immobilized. Following collapse of the fawn a doe which accompanied it "attacked" the fawn immediately by striking it about the head with her front feet. The fawn had lacerations on the face and lips when we got to it by which time the doe had fled.

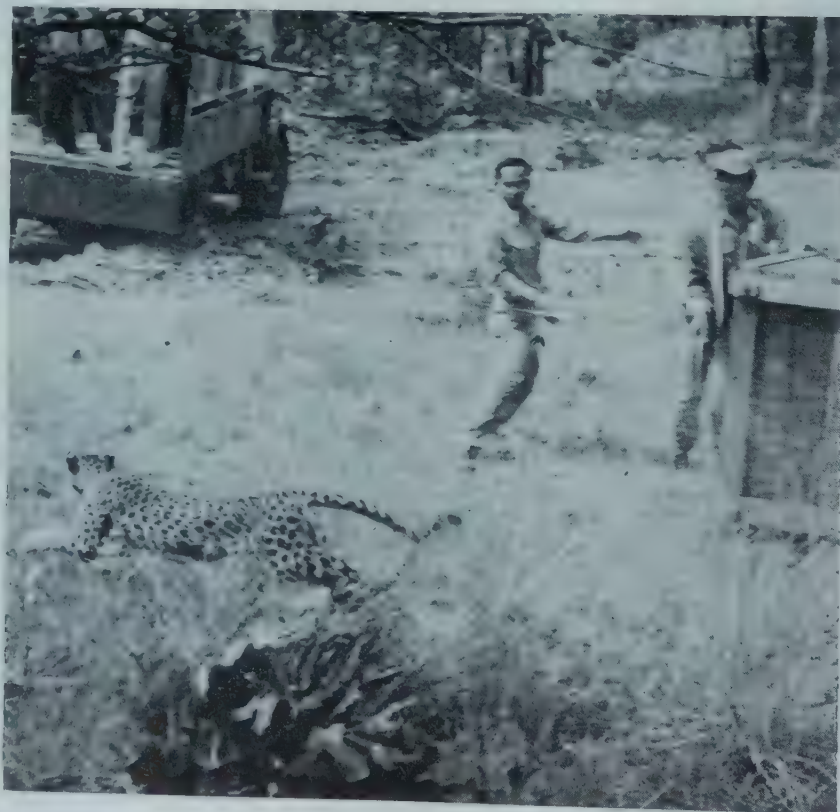
On another occasion, an adult male deer was immobilized. The deer was antlerless and was one of a group of about 20 free-ranging deer, six of which were adult males which were also ant-

lerless. Upon collapse the adult males seemed to attack the fallen deer striking it with their front feet. Injuries were not inflicted upon the fallen deer but its coat was scuffed and patches of hair were removed.

The intent of our research was not behavioural studies and where possible we have always tried to avoid immobilization attempts when more than two to three deer were in the area. Non-immobilized deer always fled when we approached the immobilized deer. Consequently, we cannot discuss whether such "attacks" might be more frequent were opportunities available. Also, animals were free ranging and social hierarchies were unknown to us. Schürholz considers that apparently aggressive behaviour toward immobilized deer might be aimed at arousal of the drugged animal. This may have been the case in our observations, particularly in the case of the immobilized fawn. On the other hand, significant injuries were inflicted upon the fawn which may indicate the attack had a more serious intent.

Patrick F. Scanlon and
Ralph E. Mirarchi, *Virginia Polytechnic Institute and State University, U.S.A.*

Moving day for a leopard in Thailand



Because of declining forest habitat the wildlife authorities in Thailand undertook to capture and relocate certain particularly valuable endangered species. This leopard and its benefactors are mutually suspicious of each other's intentions (Bangkok Post photos).

legislation

new and amended

The following list was prepared by the FAO Legislation Branch and the Forestry Department from official government journals and gazettes regularly submitted to FAO. For further information contact the governments directly.

General forest legislation

GUATEMALA

Decree No. 5-74: The "Ley Orgánica del Instituto Nacional Forestal," of 6 June 1974, is an Act setting up the National Forestry Institute, a decentralized semiautonomous state agency, the purpose of which is to ensure optimum use, protection and improvement of forest resources in conformity with the country's socioeconomic development programmes. It determines *inter alia* the objectives, mandate, organization, functions and financial resources of the Institute and enumerates the various agencies and units that are merged into it.

Decree No. 58-74: The "Ley Forestal" (Basic Enactment) of 12 June 1974 deals with policy, administration, conservation, management and regeneration of forest resources and industrialization of forest products. It includes provisions on forest land classification, forest utilization, timber transport, afforestation, forest land and forest industry taxation, offences, penalties and rewards.

INDIA (STATE OF KERALA)

Act No. 7, 1974, restricts the cutting and destruction of certain valuable trees on private lands in the State of Kerala. Restrictions concern sandalwood, rosewood and teak trees. Authorized officers are empowered *inter alia* to enter and inspect lands; order attendance of persons and discovery and production of documents; sanction institution of prosecutions. (K.G. No. 12, 19 March 1974, p. 5.)

PHILIPPINES

Presidential Decree No. 330, 1974, penalizes timber smuggling or illegal cutting of logs from public forests and forest reserves as qualified theft.

Presidential Decree No. 331 requires all forests to be developed, managed and utilized on a sustained yield basis

with the benefit of the registered foresters' technical knowledge and experience. (O.G. No. 46, 8 November 1973, p. 10572-A, H and G.)

URUGUAY

Decree No. 621/974 regulates the Forestry Law's provisions for the granting of tax and credit benefits for private forests. To claim such benefits forests must be classified first into protected, production and other forests by the Forest Service and with management plans submitted and approved. (D.O. No. 19331, 12 August 1974, p. 446-A.)

ZAMBIA

Act No. 31 of 11 September 1973 repeals and replaces the Forests Act and deals with the establishment and management of national and local forests, conservation and protection of forests and trees, licensing and sale of forest products and other matters connected with or incidental to the foregoing. (G.G. No. 1084, Suppl., 14 September 1973, p. 327.)

Forest industries

BOTSWANA

Regulations of 1974 — Factories (Woodworking) govern the operation of sawmills and other factories, and building operations and engineering construction works for trade, business, industrial or commercial undertakings using woodworking machines: machine control, working space, floors, lighting, underground rooms, wet sawing, training and supervision, use of saws, planing and other machines. (B.G.G. No. 24, 11 April 1974, p. C. 254.)

Afforestation and improvement works

ARGENTINA

Act No. 020.531 of 13 November 1973 concerns the protection, regeneration, improvement and development of forests and the protection of forest industries declared to be in the public interest. The Act restricts and regulates rights over public and private forests, requires that adequate supplies of wood be maintained. It deals with the constitution of national forests through purchase of existing ones; concentration and standardization of markets; regulation of trade in forest products; establishment

of research and training centres; provision of investment, credit and technical assistance; creation of a National Institute of Forestry (assisted by a National Forestry Commission) to ensure programme implementation. (B.O. No. 22788, 13 November 1973, p. 2.)

Decree No. 465 of 8 February 1974 awards benefits on investments in afforestation and reforestation works which conform to plans approved by the National Institute of Forests. (B.O. No. 22853, 14 February 1974, p. 4.)

PORTUGAL

Decree-Law No. 367/73 of 20 July 1973 deals with rules concerning the granting of state loans, subsidies and subventions to encourage tree plantations in private ownership, thereby promoting afforestation of land unsuitable for farming. (D. d. G. No. 169, 20 July 1973, p. 1283.)

Forest service

HUNGARY

Order No. 7/1974-MEM, 17 February 1974, of the Minister of Agriculture and Food on the training of qualified workers: concerns all agricultural, forestry and fishery cooperatives, establishments, undertakings, etc., under the authority of the Ministry of Agriculture and Food, provides detailed instructions for training workers into qualified workers; repeals provisions still in force of Order No. 13/1970-MEM of 9 May. (M.K. No. 11, 17 February 1974, p. 126.)

Trade

ECUADOR

Decree No. 0224 of 18 March 1974 regulates wood exports: they are all subject to specified regulations and the issuance of an export licence. (R.O. No. 521, 27 March 1974.)

Standardization and quality control

BELGIUM

Royal Decree of 19 April 1974 on measurement and classification of timber deals with rules for measurement by weight and volume and classification by size and quality. (M.D. No. 86, 4 May 1974, p. 6507.)

DEVELOPMENT OF HUMAN RESOURCES AND EMPLOYMENT STRESSED BY FAO COMMITTEE

The importance of human resources in forestry development was stressed by members of the FAO Advisory Committee on Forestry Education at its seventh session held in Hyvinkää, Finland, in August.

The Committee, whose main objective is to advise on the development and implementation of FAO programmes in forestry education, gave general endorsement to FAO's proposals for a medium-term programme on human resources development and employment in forestry to be submitted to the Swedish International Development Authority. It also discussed the need to include social relations components in forestry education and drew attention to the concept of the integration of work and study. It reiterated its involvement in the evaluation of forestry education programmes, underlined the need for high standards of appraisal according to social as well as economic criteria, and welcomed the Finnish Government's intention to set up an international Training Centre for Forestry and Forest Industries.

Before adjourning, the Committee elected a new Chairman, Australia's Prof. J.D. Ovington, and thanked its retiring Chairman, Prof. S.D. Richardson, of the United Kingdom, for his contribution to the advancement of FAO's activities in forestry education.

For the first time, three forestry student representatives were invited to attend the Committee's session.

Social relations units for forest services

Representatives of 14 developing countries from Africa and the Caribbean, attending a seminar on forestry social relations, recommended that their countries consider the establishment of social relations units in their forest services and that FAO be requested to assist them in this effort. They also called for the incorporation of training in social re-

lations work in forestry curricula, and the introduction of some forestry knowledge and practice in the general school syllabi of educational institutions. They suggested that, in addition to holding similar seminars in the future, FAO organize workshops on the practical aspects of social relations for public relations officers.

The seminar was held in April at FAO Headquarters in Rome and was sponsored by FAO and SIDA. It was designed as a follow-up to two previous meetings, a seminar of forestry social relations held in Sweden in 1966 and a course in audiovisual aids and public relations held in the United Kingdom in 1970. The aim of this year's meeting was to review the experience gained since then and to plan future programmes.

FAO is planning two similar seminars for French- and Spanish-speaking countries.

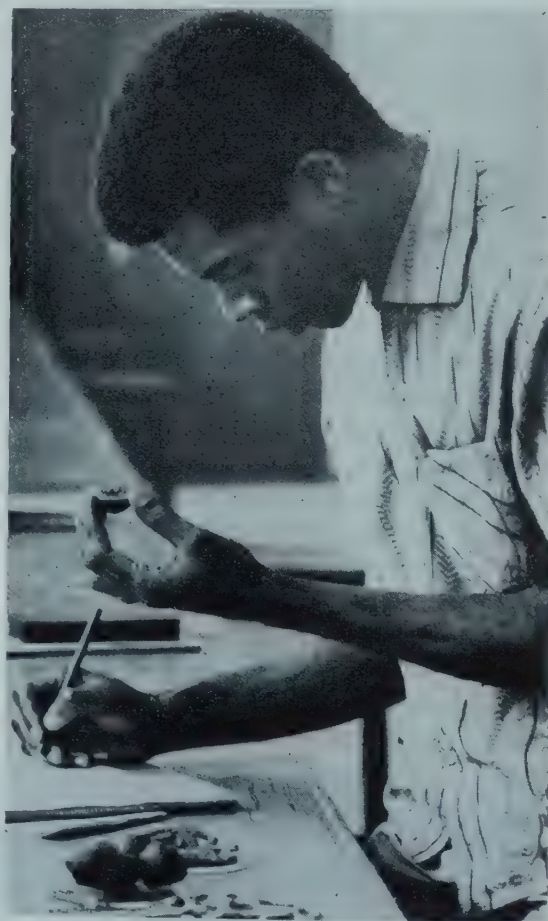
An international directory of forestry schools

A new World List of Forestry Schools has been compiled by FAO's Forestry Department. It is part of the forthcoming World Directory of Forestry Schools, to be completed in 1975, prepared on the recommendation of the FAO/SIDA World Consultation on Forestry Education and Training, held in Stockholm in 1971.

The list, divided in two parts, covers university and other forestry schools functioning in FAO Member Nations as well as in countries of forestry importance with membership in the United Nations but not in FAO. The countries are grouped in regions, listed alphabetically.

The information was obtained from a survey conducted by FAO in 1973 and further research in 1974. The list does not duplicate others since it has a wider geographical coverage, includes nonuniversity-level institutions and is trilingual

(English, French and Spanish). It has been sent to all the institutions it mentions, to forest services, professional forestry associations and other agencies concerned, and constitutes FAO's basic list for distribution of information and publications to forestry schools.



UNIVERSITY OF IBADAN STUDENT
inside tropical forestry

Technical education needs teacher training, career prospects

Principals of technical-level forestry schools from 11 countries in the Near East, Asia and the Far East attending a course in educational planning stressed the need in their homelands for more and better teacher training together with improved career opportunities.

The course, which lasted from 19 August to 13 September, was held in Stockholm and sponsored by the Swedish International Development Authority (SIDA) and FAO. The participants came from Bangladesh, Burma, India, Indo-

nesia, Iran, the Republic of Korea, Malaysia, Nepal, Pakistan, the Philippines and Thailand.

The principals agreed that priorities in technical forestry training in developing countries should include more attention to participative teaching methods, the production of textbooks and other teaching materials in the home country, and greater use of audiovisual aids. They also noted the need for broader planning of educational activities.

Forest inventory course held in Ibadan

Forestry officers from 14 developing countries in Africa and the Caribbean attended a month's course on the latest techniques in forestry survey work, held in August and September at the University of Ibadan, Nigeria.

The course, sponsored by SIDA and FAO, with the cooperation of the Agriculture Research Council of Nigeria, included lectures on objectives and planning of forest inventory, statistical and remote sensing techniques, forest mensuration, inventory design, computer programming and data processing. There were practical exercises dealing with statistical techniques, forest mensuration and computer programming. The participants discussed inventory case studies concerning Nigeria, Liberia, Tanzania and French-speaking African countries, and heard an account of Sweden's National Forest Survey.

The course was directed by Prof. P. Loetsch, of the Federal Republic of Germany, retired Head of the Inventory Section of the Federal Research Organization for Forestry and Forest Products, Reinbek. The codirector was P.R.O. Kio, Principal Scientific Officer for Forestry of Nigeria's Agriculture Research Council. J.P. Lanly, FAO's Forest Resources Surveys Officer, served as assistant director and O.O. Ntima, from Nigeria's Federal Department of Forestry, was liaison officer.

The forestry officers who participated came from Cameroon, Ethiopia, Ghana, Guyana, Jamaica, Kenya, Liberia, Malawi, Nigeria, Sierra Leone, the Sudan, Tanzania, Uganda and Zambia.

This training course was preceded by another, the first, also sponsored by FAO/SIDA, held in Sweden from 6 August to 27 September 1973, and will be followed next year by a third (FAO/Finland Training Course) to be held in Venezuela, probably in June and July.

Higher studies in wood technology and management in Ghana

The University of Science and Technology of Kumasi, Ghana, has created a two-year postgraduate course in Wood Technology and Management, leading to the degree of Master of Science (Wood Technology).

The course includes wood science, wood technology, economics and marketing, business administration and management.

Though designed to meet west Africa's needs, the course will admit students from other parts of the world provided they satisfy the University's entry requirements.

One course for four schools

Europe's four Nordic forestry schools of higher education held their second 10-day common course on "The Forests and Forestry of Developing Countries" in April 1974, at the Department of Forestry, Copenhagen.

Of the 30 students participating, 15 were from Denmark, 8 from Finland, 2 from Norway and 5 from Sweden. The course is now included in the list of optional subjects in the curricula of the participating schools; this, according to its organizers, accounts for its increased popularity. Written examinations were given in the students' home countries in May and June.

Compared to the first course, which was given in 1973, the second had fewer instructors, most of the subjects were broadened and they were covered in more lessons. Another change was that all lectures were given in English. Emphasis was placed on demonstrating that development efforts in forestry and forest industries cannot be considered in isolation but should form an integral part of a whole development effort.

The course consisted of 60 lessons, as follows (number of lessons in parentheses): introduction (1), forests and forestry in developing countries (3), social aspects of forestry (7), land-use planning (7), forests and tree species in the tropics and subtropics (7), silvicultural problems in the Near East (4), tropical silviculture (9), logging and transport in tropical high forests (4), plantation forestry (4), logging and transport in tropical plantations (3), economy and marketing problems in forest industries

(5), administration of forestry (2), Nordic development aid in forestry (4).

Three Scandinavian agencies for international development took part in the course: DANIDA (Denmark), NORAD (Norway) and SIDA (Sweden).

It is hoped that the 1975 course will be held at the Agricultural University of Norway.

Finn Helles, Copenhagen
(From *Scandinavian Forest Economics*)

Mountain roads and harvesting course in Austria

A training course on forest roads and harvesting in mountainous forests will be held in Ossiach, Austria, 1-29 June 1975. The schedule includes lectures, discussions, field trips, surveys and excursions. The list of speakers and lectures includes 34 specialists, and representatives from about 30 developing countries are expected to attend.

The course is a joint FAO and Austrian Government venture. For information write to R. Heinrich at FAO Headquarters in Rome.

More environmental education urged by OECD

The establishment of national councils on environmental education has been recommended for member nations of the Organisation for Economic Cooperation and Development (OECD).

The recommendation was one of several to come out of an environmental education conference organized by OECD's Centre for Educational Research and Innovation, held in Rungsted, Denmark, 4-7 June 1974.

In addition to setting up national councils with the aim of increasing environmental education, the group urged OECD members to establish "appropriate institutional structures," such as environmental forums, so as to strengthen and formalize lines of communication between scientists and decision-makers whose activities may influence environmental quality.

Other recommendation included:
— Adoption of "recurrent education" as a long-term strategy. This should aim at generating greater awareness of environmental issues and problems as well as creating more expertise in fields particularly relevant to environmental quality.

Education and information activities should be designed to reach three separate groups: managers and decision-makers, professional specialists with major environmental commitments, and the general public.

A multidisciplinary approach is the essence of an environmental point of view, therefore it should play a part in all professional education.

Mixed feelings about increased enrolments in North America

The steady increase in enrolments in the forestry schools of North America, especially in the United States, is a trend viewed with mixed feelings by all those involved. The larger proportion of transfer students in forestry programmes has added to difficulties in scheduling sequences of courses and in reaching higher levels of training in advanced courses. The larger numbers of graduates have raised concern about overproduction for the available professional jobs. However, the variety of jobs which graduates are entering is broadening; the greater variety in background of transfer students is frequently an asset. Many more options or specialty curricula are being developed, and high school graduates are entering college with higher attainment in mathematics, science and communication. One other result of the tighter and more varied job market is a greater premium on the master's degree, with a wider distinction between the relative competencies and functions of the technician and the professional.

Eroded budgets

All these trends toward improvement of education raise the cost. Yet at this time requests for support for institutions of higher learning are receiving very severe questioning, and inflation is further eroding the actual funds available. Therefore, many forestry school faculties are forced to admit that they know how to teach better than they are doing at present under the crossfire of limited budgets and increased enrolments.

Forestry education in the United States and Canada is tending toward making the professional more of a land resource manager and perhaps less of a biological scientist, trying to teach him to work with people as well as things, and responding to the stronger environmental quality interest of the general public. At the same time forestry education is exposed to the countervailing demands

of other sectors of that same general public who want more of the material goods which the forest can produce.

The balance point

The net result must eventually be a professional capable of avoiding both these extreme positions and of leading us to a balanced management programme for the greatest total welfare. But the means of reaching the balance point is not yet clearly seen, and all of us are going to suffer self-doubt and criticism while we work toward it. Variety in the nature of education programmes and a willingness to profit by experience are the best means of evolving toward that balance.

O.F. Hall, United States, *Virginia Polytechnic Institute and State University*;
J.A. Gardner, Canada, *University of British Columbia*

Coping with specialization in western and northern Europe

The goals of forestry education in western Europe and the Fenno-Scandinavian countries have widened. The amount of knowledge available to forestry has increased very much in recent years as a result of research. Students therefore have to give more attention to applied sciences than previously. But the number of years of university study have not expanded and the old conflict between education in breadth and education in depth is more acute. Forestry needs more and more specialists, but it still needs generalists. It can even be said that today "generalism" has become a form of specialization.

The cost of education per student increases sharply when studies become highly specialized. It becomes difficult for relatively small countries to maintain the minimum number of qualified teachers required for each specialty. One way of approaching this problem is through cooperative efforts between countries within a region and an attempt at this has been initiated in the Fenno-Scandinavian countries. It includes, among other things, the arrangement of joint specialized courses in subjects where the number of interested students is too small to warrant the same specialty being taught in each country.

The Fenno-Scandinavian countries used to lay great emphasis on practical

training in forestry education. Students were required to gain experience as forest workers before they started their university studies and forestry education was, in that respect, markedly different from other forms of education. Today, however, under pressure from a general standardization of education, practical training in forestry education is more and more declining. This has proved unfortunate. The motivation for study has decreased and students do not have a frame of reference for their newly acquired experience and knowledge. Their study results have therefore deteriorated.

Lost opportunities

There have been attempts at reintroducing practical training but these have met with unexpected difficulties. Forestry in the Fenno-Scandinavian countries is today highly specialized and involves advanced technology, therefore it is hard to place students as forest workers. The result is that today much of the practical education is carried out within the framework of the forestry schools. This is unfortunate, because students are losing valuable opportunities for social training and experience which they can only get as workers on the job.

Vadim Söderström, Sweden
University of Stockholm

Ecological certification in U.S. Forest Service

The U.S. Forest Service has established a new, strict certification programme to ensure that treatments applied to national forests are prescribed or reviewed for ecological soundness by certified Forest Service silviculturists. Certification is based on experience, graduate-level education and comprehensive examination. Candidates are screened on a competitive basis by the Forest Service and university professors. Foresters considered for training must have a minimum of one year of recent professional-level experience in a silvicultural or closely related field, and a bachelor's degree in natural science. Certification is valid for a three-year period after which the forester is required to take a two-week refresher course and pass an examination to maintain his qualifications.

This programme is officially known as "Continuing Education and Certification in Forest Ecology and Silviculture."

BOOKS AND REPORTS

YEARBOOK OF FOREST PRODUCTS (1972)

The *Yearbook of Forest Products* (1972), latest in the FAO series, has been issued in an improved computerized form.

A basic reference book, it records the performance of a wide variety of forest products in terms of tonnage produced, production values, and the values and directions of flow of international trade for the principal countries of the world concerned with wood and wood products. It covers 1961 through 1972.

Yearbook of Forest Products (1972), FAO, Rome, 1974; 90 pages, trilingual edition (English, French, Spanish); price US\$13.30, £5.40, FF67.

LOGGING AND LOG TRANSPORT IN TROPICAL HIGH FOREST

Information concerning logging and transport methods and techniques and costs in developing countries is scarce, especially where the tropical high forest is concerned.

Logging and Log Transport in Tropical High Forest, a new manual prepared by the FAO Forestry Department's Logging and Transport Branch, focuses attention on analytical approaches required to quantify output and cost data for these activities. It examines the influence of physical and economic conditions and gives production and cost data where available for the most commonly used logging methods.

Logging and Log Transport in Tropical High Forest (A manual on production and costs), FAO Forestry Development Paper No. 18, FAO, Rome, 1974; 90 pages, English, French and Spanish editions; price US\$3.00 or £1.20.

SEED FROM CANADA

A List of Seed in the Canadian Forestry Service Seed Bank, by B.S.P. Wang and B.D. Haddon, was issued in June 1974. This report, in French and English, may be obtained from the Petawawa Forest Experimental Station, Chalk River, Ontario. It is also iden-

tified as Information Report PS-X-53. In 1973, the station shipped more than 300 seed lots in response to requests from within Canada and from 12 other countries.

STORING TREE SEED

Tree-Seed Storage by B.S.P. Wang, is a 30-page report in English, with a résumé in French, issued by the Canadian Forestry Service.

Dr. Wang, of the Petawawa Forest Experimental Station, Chalk River, Ontario, reviews seed characteristics of trees, storage principles and major factors affecting seed storage. He summarizes the times of cone and seed maturity and the storage requirements of native Canadian tree seeds and outlines further research needed to prolong the safe storage of large hardwood seed. The report contains two tables, one showing "Frequency of seed years of native tree species" (27 species of conifers and 37 hardwood species) and another which is a "Summary of specific conditions for safe storage of tree seeds."

FROM EAST AFRICA'S HERBARIUM

Upland Kenya Wild Flowers by A.D.Q. Agnew, is the latest major work on the flora of tropical east Africa. It covers the whole herbaceous vascular plant flora — except the grasses and sedges — of Kenya above 1 000 metres, a total of no less than 2 950 species, of which 943 are illustrated by line drawings.

The work includes several contributions from specialists, most of whom are associated with or on the staff of the East African Herbarium, a division of the East African Agriculture and Forestry Research Organization. Of note is an account of the ferns by R.B. Faden, the first of its kind, and Dr. Agnew's account of the Compositae, of which the most recent description until now (and without illustrations) was written in 1877.

The book is published by the East African Agriculture and Forestry Research Organization, P.O. Box 30148, Nairobi, Kenya.

A DENDROLOGY REFERENCE FOR TROPICAL TREES

Trees of Puerto Rico and the Virgin Islands, Vol. II, by Elbert L. Little Jr., Roy O. Woodbury and Frank H. Wadsworth, has been published by the U.S. Forest Service. It follows Volume I, *Common Trees in Puerto Rico and the Virgin Islands*, which came out in 1964 in English and in 1967 in Spanish.

Dr. Little has been the dendrologist for the U.S. Forest Service in Washington, D.C., since 1942. Dr. Wadsworth is director of the Institute of Tropical Forestry, U.S. Forest Service, at Rio Piedras, Puerto Rico, and began research work there in 1942. Dr. Woodbury has been plant taxonomist at the University of Puerto Rico since 1956 and earlier was Professor of Botany at the University of Miami in Coral Gables, Florida.

Trees of Puerto Rico and the Virgin Islands, Vol. II (Agriculture Handbook No. 449), 1 024 pages, U.S. Government Printing Office, Washington, D.C. 20402, price (clothbound) \$13.45; Stock Number 0100-20884 (Class No. A1.76:449).

NEW ENVIRONMENT QUARTERLY

Environmental Conservation is a new international quarterly journal put out by the Foundation for Environmental Conservation, Lausanne, Switzerland.

The new journal states that it is "devoted to maintaining global viability through exposing and countering environmental deterioration resulting from human population pressure and unwise technology." Nichols Polunin is editor.

The International Union for the Conservation of Nature and Natural Resources (IUCN), the International Conferences on Environmental Future (ICEF) and the World Environment and Resources Council (WERC) are all listed as collaborators, with financial support coming from the World Wildlife Fund (WWF).

Yearly subscription is S.Frs. 120 (about \$41).

World Forestry Day

In November 1971, at the request of the European Confederation of Agriculture, FAO's member governments supported the annual observance of 21 March as World Forestry Day. Since then many nations have adopted this practice. In schools and public buildings in Nigeria, World Forestry Day posters appeared calling attention to "Our Forest Heritage." In the United States, a presidential proclamation marked World Forestry Day as part of a week of activities and ceremonies about the role of the forest and forestry in every man's life. In Australia, a national committee representing states, territories, universities and timber producers launched a campaign which included distribution of free booklets (*Forests are forever; Forestry, the environmentally compatible industry*) and a 15-minute television film. In multilingual Switzerland, the press, radio and television, encouraged and assisted by the information services of the state forest service, described in French, German and Italian the important role played by forests and forestry in the economy, in the protection and conservation of the environment, and in the mountain heritage and culture of the Swiss people.

The need to explain

Forestry, more than other branches of agriculture, is an activity which needs to be brought before the public, as is well noted in the article entitled "Explaining forestry to forest users" (page 31). But to make the practices and benefits of forestry comprehensible to the public is not as simple as it may at first seem. This is partly because of the long time scale involved in forest management compared to the increasingly rapid pace which modern man has come to accept as normal in so many other activities. In some countries there is also a residue of public suspicion of foresters as the "policemen of the woods" and this has to be overcome.

Every forester appreciates and understands the value of the forest as a source of raw material, as a provider of local employment and national income, as the great sponge which gathers and releases water, as the habitat for flora and fauna that otherwise would become extinct, and as the environment and atmosphere in which man feels uniquely at home with nature. If foresters and forest services talk in plain language about that which they know best, people will listen, understand and be with them.

Sir Frank Fraser Darling rightly says (page 2): "Man is weaned of the forest, and yet the forest is still very much a part of us." This is at the root of the concern of so many people today for the preservation of forests and other natural environments.

We would like to know about the various kinds of World Forestry Day activities in different countries so as

to better communicate ideas among them. Those in charge of such activities should send samples of their efforts — posters, booklets, press cuttings, photographs and films — to *unasyuva*.

FAO congratulates and supports the European Confederation of Agriculture in its efforts to promote World Forestry Day.

Agri-silviculture: more work needed

Shifting cultivation, the oldest system of farming still widely practised, is destroying forests, degrading land and causing erosion in many parts of the world on a vast scale. There are an estimated 3.6 thousand million hectares currently under shifting cultivation throughout the world and it is believed that some 250 million persons live by it.

The situation is particularly serious in countries where there is population pressure on the land, such as in the tropics of Asia. This is a problem of historic importance in which food production and forest management are the interlocked elements and, it is widely felt, the foresters have the key.

As is shown in the article by Krit Samapuddhi of Thailand (page 20) and the report from the Philippines by Rifat Alwi (page 22), agri-silvicultural methods — *taungya* and its variations — are providing viable working alternatives to uncontrolled slash-and-burn agriculture. In various ways agri-silviculture seeks to create harmony between crop farming and tree farming. Both reports point out that agri-silviculture is not easy and does not always work. Patient, flexible, intelligent administrators with an understanding and sympathy for the farmers of the forest, their traditions and their human needs, are among the most important elements for the success of any system of agri-silviculture.

Preventing forest destruction

At a time where there is an awareness throughout the world of the serious imbalance between food production and distribution and population increases, there should be much more research and practical work on agri-silviculture for tropical countries. As foresters we should also spread an awareness of the imbalance between the vast areas of the tropics which are being devastated by unchecked slash-and-burn cultivation and the relatively small areas where agri-silviculture is being practised, and in good part successfully practised. The latter can and should be greatly increased. Forest services in tropical countries and university faculties specializing in tropical forestry should concentrate more resources and efforts in these directions.

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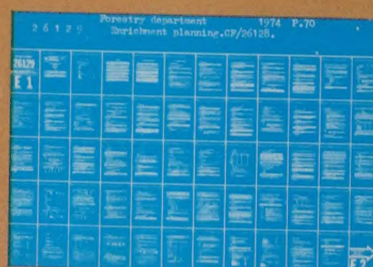
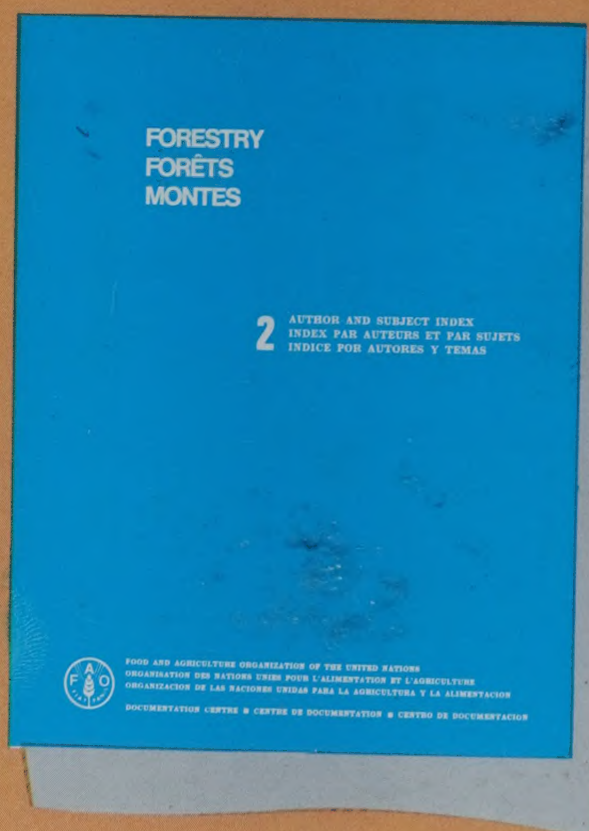
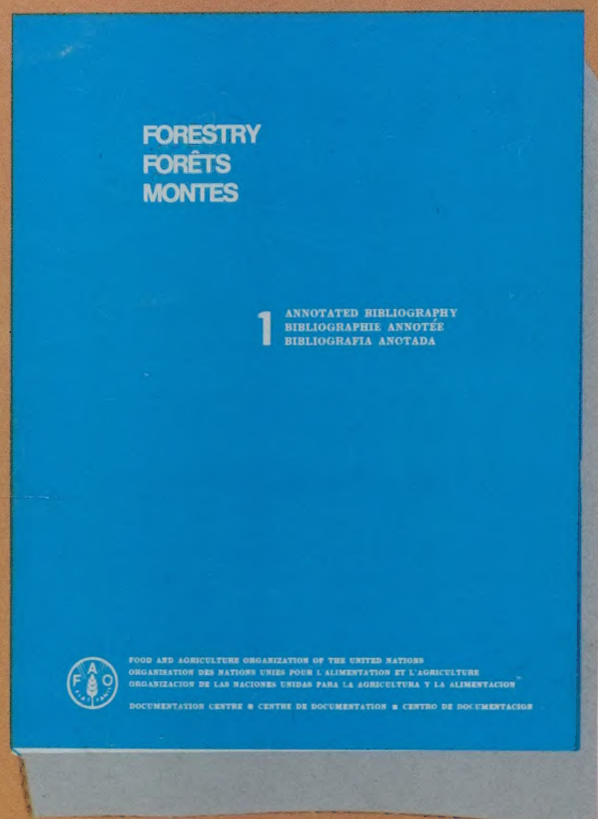
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